

# COMPUTING RESEARCH NEWS

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## Community Service Opportunities

By Jim Foley, CRA Chair

The computing research community is effective for two reasons: great researchers, and great researchers who are willing to give some of their time to serve the research community.

There are a number of ways to provide service to the community. For example, it might take the form of reviewing papers and proposals or by serving on editorial boards, review panels, or conference program committees. Or it might involve chairing a program or serving as editor-in-chief of a journal. Virtually everyone does some of this on a part-time basis.

Service might also be provided to a broader community through a part-time role as a member or officer of the CRA board of directors. And opportunities exist on a national level to serve full-time in a rotating position at a government agency. These government positions include program director, division director, or CISE assistant director at NSF; or program manager and office director at DARPA or other government funding agencies.

This past year, two senior members of our community

completed full-time service roles and returned to their academic positions. Shankar Sastry (Berkeley) served for two years as Director of the Information Technology Office at DARPA, where he was responsible for a computing research budget in excess of \$200M. Ruzena Bajcsy (Penn) completed more than 3 years as CISE assistant director—the longest serving CISE AD since the directorate was created, and the first woman to hold this position. Ruzena managed a directorate budget that grew from approximately \$300M when she joined NSF to more than \$450M during the past fiscal year. CRA honored Ruzena for her service at a reception in August (see photo elsewhere in this issue).

Our thanks to Ruzena and Shankar, and to the many other rotators who serve or have served at NSF, DARPA, and other funding agencies.

Our community appears to be ambivalent about taking up this kind of full-time community service with a funding agency. Going to Washington, it is argued, disrupts

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## Rotators Help Shape NSF Programs

By George Strawn



George Strawn

If you are a mid-career or senior computer and/or information science and/or engineering faculty member (briefly, a member of the CISE community), why should you consider coming to NSF as an "Intergovernmental Personnel Act (IPA) assignee" for a couple of years? And if you do consider it, how easy might it be to do?

The author of this article, who went to NSF twice as a "rotator," will offer some answers to these two questions. (The informal term "rotator" can refer to both IPA and several other modes of temporary NSF employment. I'll use it here to refer to an "IPA rotator" because the IPA mechanism is usually the appropriate one for a university faculty member to use.)

As readers will know, NSF research programs are run by program directors (PDs), who are a mix of federal employees and rotators. Our rotator PDs provide NSF with, among other things, an "academic flavor" that helps to make it the least bureaucratic of federal agencies. Rotators are indispensable in helping to provide the staff power to get our work done. So the first reason to consider coming to NSF as a rotator is to help assure our ability to continue providing research support to the CISE community.

And there are personal benefits to being a rotator as well as benefits to the CISE community. First, you have the interesting experience of helping to shape the NSF program(s) serving your area of expertise. This can involve re-focusing a program's area and/or developing new program areas. Putting in place the right program announcements and leading the effort to evaluate and fund proposals written in response to those announcements can be both challenging and rewarding.

Second, you not only have a chance to interact broadly with the members of your community, but you also may want to get involved with

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## PITAC Reviews Progress, Moves Forward

The President's Information Technology Advisory Committee (PITAC) met in Arlington, VA on September 25 to review progress in implementing the recommendations of its 1999 report, *Information Technology Research: Investing in Our Future*. Over the next few months the findings of the original PITAC report will be revised and presented for comment at the committee's next meeting in February 2002.

In an address to the committee, NSF Director Rita Colwell praised the 1999 report as influential and indicated that "PITAC is indispensable to NSF." In her view, "Investing in IT is one of the most important things we can do for our country." She announced at the meeting that NSF would make 309 awards totaling \$156 million as part of the Information Technology Research (ITR) initiative. More than 2,000 proposals were received.

The committee devoted one session to a discussion of issues resulting from recent changes in the environment of the IT industry. Among these are the changing fortunes of many dot-com companies, the drop in the availability of venture capital,

and the uncertainties in the economy. Overall, committee members expressed optimism that while this new era offers many challenges, it also presents new opportunities for IT. From the perspective of the IT workforce, some observed that more researchers would return to and remain in universities, rather than move to industry positions. There also was a sense among the members that the pace of innovation is continuing, amid increasing consolidation within technologies, industries, and infrastructure elements.

One panel (personal/individual security) and four PITAC subcommittees provided briefings. The national security panel did not brief the committee at this time. Information on the briefings is available on the Web at: <http://www.itrd.gov/ac/agendas/agenda-25sep01.html>. Some brief highlights of the reports are provided here.

The Panel on Personal/Individual Security reported that it had met with a number of government agencies and will meet with privacy advocates. One finding is that a fundamental definition of 'identity' is needed. Identity theft is a major

problem and a compromise is needed that will address the needs of business to collect information and the need for consumers to protect their personal information. This issue requires the attention of both business and government.

The Subcommittee on Socio-economic, Education, and Workforce Issues (SEW) reported that while many high-quality grant applications had been submitted to participating agencies (NSF, DOE, NASA, and NIH), only a few could be funded. Funding levels are still too low, and

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Our thoughts and condolences go out to members of the computing research community, their families, and friends who suffered losses from the September attacks in New York and at the Pentagon.

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## Expanding the Pipeline

# Transforming the Culture of Computing at Carnegie Mellon

By Lenore Blum

*This article is an abridged version of "Women in Computer Science: The Carnegie Mellon Experience," a chapter that will appear in The Innovative University, Daniel P. Resnick and Dana S. Scott, Eds., Carnegie Mellon University Press, Pittsburgh, PA, 2002. Permission granted by Carnegie Mellon University Press. Faye Miller assisted with the original report.*

In 1995, the Computer Science Department at Carnegie Mellon University (CMU) began an effort to bring more women into its undergraduate computer science (CS) program. At that time, just 7 percent (7 out of 96) of entering freshman computer science majors at Carnegie Mellon were women. Five years later, in 1999, the percentage of women in the entering class had increased fivefold to about 38 percent (50 out of 130).

careers in the United States has declined precipitously during the past decade, and suggest this is unlikely to change. Whether or not this conclusion is valid, it is the view of many observers in the field, and indeed was cited by Rita Colwell, Director of the National Science Foundation, in her keynote address at the 2001 Grace Hopper Celebration of Women in Computing.

We hope the Carnegie Mellon experience may offer inspiration, ideas, and concrete suggestions to others who wish to reverse this perceived trend.

### Why (and How) the Increase?

It may be helpful first to say a few words about the history and structure of computer science at Carnegie Mellon. The Computer Science Department (CSD) and its Ph.D.

then Associate Dean for the undergraduate program, spearheaded an intensive effort to understand and change the representation of women. He collaborated with Jane Margolis, a social scientist and expert in gender equity in education, on a research study aimed at acquiring a deeper understanding of the nature of the problem and establishing a sound basis from which to develop interventions.

Funded by the Sloan Foundation, the project consisted of hundreds of interviews with both male and female CS students about their histories with computing, interests, motivations and aspirations, reasons for majoring in CS, and their experiences in the undergraduate program. Conducted over a four-year period, the project was able to track many students throughout their time at CMU. By interviewing students once a semester, the researchers witnessed the ups and downs of their experiences and changes in attitudes over time. Most importantly, they were able to identify crucial periods in the students' attachments to the field, and factors that contributed to, or inhibited, their ability to succeed.

The study yielded significant insights into the many layers of the problem, not only in terms of bringing women into computer science, but also of retaining them. Four problem areas were identified: 1) experience gaps, 2) confidence doubts, 3) the curriculum and pedagogy, and 4) peer culture.

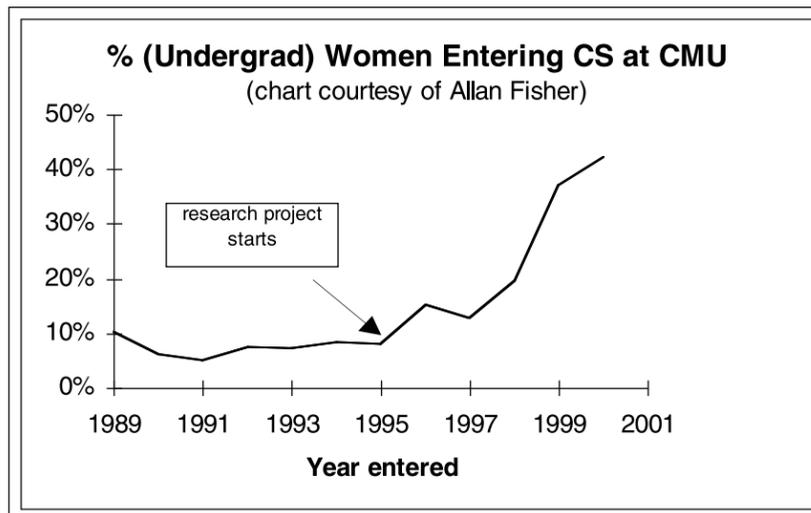
The findings of this study have been well documented elsewhere,<sup>5</sup> and we will not go into details here. Suffice it to say that the project set the stage for further efforts, including developing a blueprint for action, confirming hunches, and serving as an informational resource for faculty and other potentially supportive parties.

### Summer Institute for AP CS Teachers

Clearly the problem of few women entering the field of computer science is inherited. For example, in 1997 only 17 percent of Advanced Placement (AP) CS test-takers were female, the lowest of any AP exam that year.<sup>6</sup> This amounted to a gain of only 1 percent in 10 years.

In 1995, prompted by impending revisions in the AP CS exam, the NSF issued a call for proposals to prepare high school teachers for the change. Allan Fisher saw this as a fortuitous opportunity to work with teachers to address gender-gap issues while they were motivated to gain new expertise. Thus the Summer Institute for CS Advanced Placement Teachers (6APT) was conceived. With a grant from the NSF, Fisher—together with Jane Margolis, computer equity expert Jo Sanders, and Assistant Dean Mark

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Rather than an endpoint, the increasing number of women in the program signifies the beginning of a crucial period of transition for women in computer science at CMU. We are now faced with the challenge of ensuring that women and men in the program thrive. Starting in the academic year 1999-2000, there has been a concerted effort to foster a community committed to this process.

Before outlining the factors that have been crucial to the success of our efforts thus far, it is worth noting that such dramatic increases in the number of women in computer science do not appear to be widespread. In fact, the widely cited statistics from the articles "The Incredible Shrinking Pipeline"<sup>1</sup> and "The Incredible Shrinking Pipeline Unlikely to Reverse"<sup>2</sup> indicate that the percentage of women entering computer science programs and

program were inaugurated in 1965; the undergraduate major was not instituted until 1988 (first as a Math/CS major and then in 1992 as a CS major). Typically, students enter the computer science major as freshmen. In 1988, the department evolved into the School of Computer Science (SCS), which now comprises seven departments (including the CSD), centers, and institutes of education and research.<sup>3</sup> Each of the divisions offers graduate programs; undergraduate students major in CS, but can also dual major in another program.

### Research Basis to Support Change

During its first several years, the undergraduate CS program was plagued by very low numbers of women—a trend common to most comparable Ph.D.-granting CS departments.<sup>4</sup> In 1995, Allan Fisher,

### Computing Research Association

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### REMINDER TO CS AND CE CHAIRS:

Taulbee Surveys Were Due November 2.

Please make certain your survey has been submitted to:

[www.cra.org/Survey/FillOut](http://www.cra.org/Survey/FillOut)

Questions?

Contact: [survey@cra.org](mailto:survey@cra.org)

# Survey Shows Significant Increases in CS Research Lab Salaries

By David Waltz

In November 2000, CRA conducted its fourth Industrial Salary Survey of CS Research Laboratories. Organizations were asked to provide data about *base salary* (the annual salary independent of items such as bonus and options) and *total compensation*, which includes *variable cash* and *variable non-cash compensation* (items such as bonuses and the value of stock options which respondents were asked to estimate). The survey collected minimum, average, and maximum salaries for researchers in their first year after receiving their degrees and for four additional five-year periods. Companies that completed the survey received the results in January 2001.

Fourteen organizations representing 1,189 researchers responded to the 2000 survey. (In 1999, twelve organizations with 1,378 researchers participated.) Of these researchers, 72 percent held Ph.D.s, 21 percent M.S. degrees, and 6 percent B.S. degrees. A portion of the survey's results are summarized in Figure 1, which reports both the means and medians of base salaries and total compensation for researchers with doctorates.

Although there are differences in how salary data are tabulated and reported between this survey and CRA's Taulbee Survey of Ph.D.-granting CS/CE departments, Table 1 provides nine-month faculty salary data for the 2000/2001 academic year.

## Observations

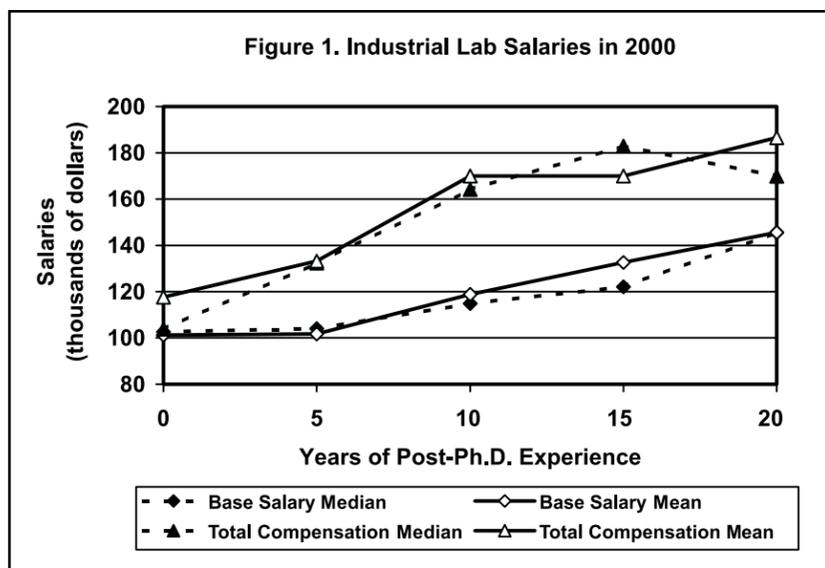
Compensation was strikingly higher in 2000 than in 1999, especially for the most highly paid researchers and for those with the most experience. For those with six or more years of experience, the average maximum total compensation more than doubled, with those having 16 or more years of experience averaging a maximum of \$405,000! For the same period, the average base salaries of those with doctoral degrees increased between 5 percent and 29 percent, while average total compensation increased between 17 percent and 39 percent. In 2000, average variable compensation appears to have accounted for between 14 percent and 30 percent of total compensation.

This month CRA will again conduct its survey of industry lab salaries for 2001. Companies that complete the survey will receive the full set of results in December.

This article, as well as those regarding previous Industrial Salary Surveys, is available online at <http://www.cra.org/statistics/industrial/>.

I would especially like to thank Jay Vegso of CRA for his excellent efforts in collecting, analyzing, and organizing this data; and CRA's Patrick McMullen for generating Figure 1.

*Dr. Waltz is President of the NEC Research Institute. He is a member of the CRA Board and chairs CRA's Industry Committee.* ■



**Table 1. AY00/01 Nine-month Salaries among U.S. CS Departments**

Faculty Rank	Average of all Salaries
Non-Tenure Teaching Faculty	\$51,909
Assistant Professor	\$68,628
Associate Professor	\$76,997
Full Professor	\$99,690

Source: CRA 1999-2000 Taulbee Survey

# Computer Engineering Freshmen Numbers Rise

By Matt Doster

More students are choosing to study engineering—many more! Recently published data from *Engineering and Technology Enrollments, Fall 2000* reveal that the national total of engineering's freshmen class increased by 8.3 percent last fall, and has increased an average of 4.8 percent per year over the past 4 years. The actual size of the freshman class in 2000 was 101,773 full-time students.

These overall increases in engineering freshmen over the past few years come on the heels of some historic lows in the numbers of engineering students. Two years ago, the number of engineering bachelor's degrees awarded dropped to a 19-year low, while in 1994 the freshmen engineering class—at 85,047 students—was the smallest since 1976.

A significant underlying factor in the increase of engineering students is the dynamics of the U.S. population. The current increase parallels an increase in the college-age population throughout the United States. The U.S. population for 15- to 24-year-olds declined in the 1980s and reached a plateau in the early- to mid-1990s of around 35 million people, according to the U.S. Census Bureau. Now this portion of the

population is increasing in number, and the bureau is projecting substantial increases through the year 2010. (Specifically, the bureau projects this population group to reach about 43 million people and to increase by two-thirds of a percent of the overall population by 2010.) Thus, the outlook is favorable for those who want to see engineering enrollments continue to increase.

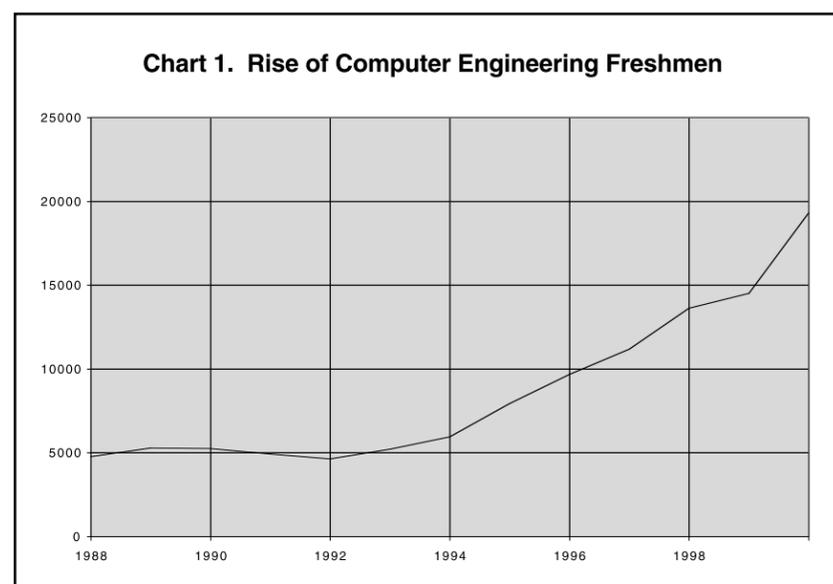
Nevertheless, growth in the college-age population only provides information on the size of the pool of available students. It is difficult to determine precisely why students actually choose to study—or not to study—engineering. During the late 1980s and early 1990s, while the college-age population was decreasing or stable, the number of undergraduate college degrees being awarded was actually increasing. Simultaneously, the number of engineering degrees was declining. Quite simply, a smaller proportion of college students have been choosing engineering during the late 1980s and 1990s. It will be interesting to see whether the recent increase in number of freshmen engineering students will be great enough to increase the percentage of engineering students as well.

## Computer Discipline Tops the List

These recent increases are due, in large part, to the continued rise in students studying in departments of computer engineering. In 1999, the number of freshmen in computer engineering departments totaled 14,504; in 2000, the number had grown by a third to 19,311. As a percentage, this large increase is

actually slightly less than the increase from 1994 to 1995, when the total jumped from 5,939 to 7,922. The computer engineering departments have been growing rapidly since 1992, which followed a few years of drop-off (see chart 1).

The Engineering Workforce Commission (EWC), which conducts the surveys on which the *Engineering and Technology Enrollments* series is based, increasingly encounters a



Computer Engineering  
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# Research Agenda for Networked, Embedded Computing Systems—New CSTB Report

By Lynette I. Millett

Driven by decreasing costs and increasing capabilities, computing and communications technology is being embedded into a growing range of devices linked together through networks. Beyond desktops and laptops connected to the Internet, information technology is connecting a variety of devices and sensors that will allow information to be collected, shared, and processed in unprecedented ways. Such networked systems of embedded computers are being deployed in applications from automotive telematics to precision agriculture to military defense systems; from smart homes and buildings to *in situ* environmental monitoring to biotechnological research. Their broad applicability gives these systems the potential to transform the way people interact with and manage their environment.

A new report from the Computer Science and Telecommunications Board, *Embedded, Everywhere: A Research Agenda for Networked Systems of Embedded Computers*, outlines the broad systems-level approach that will be needed to solve the problems presented by networked embedded computing systems (referred to throughout the report as EmNets). It describes the enabling technologies that have made such systems possible and goes on to outline a comprehensive research

agenda aimed at achieving functionally powerful, flexible, long-lived, trustworthy EmNets. The report concludes that the new problems posed by these technologies mean that *incremental improvements to today's solutions will not suffice to realize the full power of EmNets*.

The research challenges presented by these emerging systems stem in part from the unique set of constraints under which they will be operating and in part from the diverse range of applications for which they will be used. The systems are likely to be large and heterogeneous, and many of their components will be tightly coupled to the physical world. EmNets have to cope with severe constraints on memory, bandwidth, and energy. Many EmNets, in whole or in part, will persist for long periods of time, making upgrade and rebooting a challenge. In addition, they will often require autonomous control systems, and the people who use or interact with them are unlikely to be systems experts. All of these factors combine to mean that more traditional approaches to distributing computing will not be adequate to meet the needs of EmNets.

## Scope and Challenges

The scope of the problems that will need to be addressed to achieve viable, robust, generalizable EmNets

is large. From continued advances in component technologies, to the development of algorithms and methodologies for large-scale self-configuration and adaptive coordination, to ensuring the trustworthiness of these systems, to the creation of new abstractions and models of computation, work on these systems will need to encompass virtually all aspects of computing research.

At the component level, silicon scaling, advances in computing hardware, software, and wireless communications, and new connections to the physical world such as geolocation and microelectromechanical sensors (MEMS) will be the technological building blocks. Networking solutions that work well enough for today's systems are based on many assumptions that are inappropriate for EmNets. For instance, the potentially huge number of nodes, the ad hoc system extensions expected, the extended longevity, and the heavy reliance on wireless communications between nodes will collectively invalidate some basic assumptions built into today's network solutions. Work in all of these areas, as well as in power management and energy sources and in software development, must therefore continue to advance.

Self-configuration involves the addition, removal, or modification of elements in an EmNet and the subsequent process of establishing

interoperability. In contrast, adaptive coordination addresses changes in the behavior of a system as it responds to changes in the environment or system resources (such as energy). Together, these processes are critical for creating robust and scalable unattended EmNets. Significant research progress is needed to achieve automatic self-configuration among large numbers of distributed nodes, while the encompassing system continues to conform to well-defined trust and failure models. There is also much work to be done in the area of distributed adaptive coordination to support EmNet applications. Such techniques are particularly critical for unattended, resource-constrained systems.

The global features that will be required of these systems include reliability, safety, security, privacy, and usability. Such features must be built into a system from the start; it is difficult, if not impossible, to add them in an adequate and cost-effective manner later on. It is the combination of an open system architecture with distributed control that makes adding these sorts of features to EmNets such a challenge. Each of these features presents significant challenges in more traditional distributed systems such as the Internet. Coping with the new constraints

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# Graphical Models for Automatic Speech Recognition

By Jeff A. Bilmes

Jeff Bilmes is the third CRA Digital Government Fellow. The following article is a synopsis of his presentation to the Office of Engineering and Technology at the Federal Communications Commission on June 11, 2001.

In 1968 it was predicted that by 2001 we would have a Hal 9000 computer with the ability to transcribe, understand, and respond to human speech. Here we are, nearing the end of 2001, and what do we have instead? We have desktop PCs that can produce transcriptions (often errorful) of clearly articulated speech. We can use our voice to make airline reservations via somewhat heavy-handed automated systems. We can automatically intercept, transcribe, and data-mine telephone conversations (surveillance technology crucial for national security), but even the best transcription performance has an error rate of no better than about twenty-five percent. As the conversations become more fluent, or when the accent or dialect changes or background noise increases, the number of errors skyrockets.

Despite this apparently bleak picture, automatic speech recognition (ASR) has seen amazing progress over the past 30 years. The



Jeff Bilmes

capabilities of today's computers would inspire wonder compared with those available in 1968. This is due not only to the incredible increases in microprocessor performance, but also, and just as impressively, to major conceptual and algorithmic advances. A 1968-era speech recognition algorithm running on a 2.2GHz Pentium 4 would pale in comparison to today's techniques.

But just as current capabilities would have seemed incredible in 1968, so the capabilities of 2034 would appear to us today. The technology underlying automatic speech recognition is still in its infancy. This article, a synopsis of the author's recent CRA Digital Government

Fellowship lecture, will first briefly survey the state of the art in the field of automatic speech recognition. It will then make a case in favor of graphical models as one of the methodologies holding promise to greatly improve speech recognition algorithms.

The primary technology behind automatic speech recognition is inspired by statistical communications theory, where a source message is sent through a noisy communications channel to a receiver. It is the job of the receiver to infer the most probable original message. In automatic speech recognition, however, a message might undergo several noisy transmission stages before arriving at its ultimate destination.

Consider, for example, the following sequence between an original message (an idea) and final destination (the ear): a conceptual idea, a string of words, a string of phones, and an acoustic waveform, first as emitted by the human vocal apparatus and then as presented to the auditory system. Communications theory requires an understanding of the statistical relationships between the message as it undergoes the several transformations from the source, through

each stage, to the ultimate receiver. With such an understanding, these relationships can be "inverted" to produce a probabilistic model that can yield the most likely source message for each given received message.

Unfortunately, it is not known what these statistical relationships truly are, or even if such a sequential model is appropriate. For example, implicit in the above is a possible problem called the Markov assumption: given the message at a certain stage in the model, all earlier stages are irrelevant to determine the message at later stages. Is it true that, given knowledge of the string of words, the acoustic waveform is irrelevant to the original idea? Probably not.

The Markov assumption is applied not only to the semantic hierarchy, but also to time. That is, the past is irrelevant to the future given the present. Is this true in language, or might there be some lingering hidden effect of the past, not manifest in the present, that can influence the future? While the model will assume the former, this assumption nevertheless is the bedrock of all modern speech recognition systems.

Graphical Models  
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# Historical Trends from Taulbee Surveys: Ph.D. Programs and Ethnicity

By Jay Vegso

This is the third in a series of articles on trends in data from the Taulbee Survey and its antecedents, which stretch back to 1970. The first two articles dealt with faculty salaries and the number of women who have received degrees or who are university faculty members. This article reports on the ethnicity of computer science and computer engineering (CS/CE) Ph.D. recipients and students in the United States and Canada. All of these articles are available on the CRA website ([www.cra.org](http://www.cra.org)).

Due to changes in the Taulbee Survey, including the addition of new ethnic categories, it is difficult to summarize long-term trends. As a result, Table 1 reports the ethnic

background of CS/CE Ph.D. recipients since the 1993-94 academic year, when the categories and data attained consistency.

As can be seen, the proportion of Ph.D.s granted to non-Hispanic Whites ("whites") has generally declined over the past three years, while the proportion granted to nonresident aliens has increased steadily. Indeed, 1999-2000 was the first year in the history of the survey in which a greater proportion of doctorates were granted to nonresident aliens than to whites. The decline in the proportion of degrees going to whites has not translated into gains for other ethnic groups, however, and the Asian or Pacific Islanders group

has even experienced a decline of its own.

While the proportions in Table 1 are useful for tracking trends, the actual number of degrees granted to the different ethnic groups can present a starker picture. Since 1970, 8,605 CS/CE doctorates have been granted to whites, while only 145 have been granted to African-Americans. Since 1984, when the Taulbee Survey started to track Hispanics as an ethnic group, 6,429 doctorates have been granted to whites, while only 222 have been granted to Hispanics.

Enrollment data can suggest possible trends in future Ph.D. production. These figures are given in Table

2, which tracks the percentage of enrolled Ph.D. students by ethnicity. As in Table 1, the two most noticeable trends are the increase in the proportion of nonresident aliens and the decline of whites who are seeking their doctorates. Asian or Pacific Islanders are also less well represented than they were in 1993-94. All of this would suggest that a greater proportion of Ph.D.s will be granted to nonresident aliens in the coming years, at the expense of whites and Asians. At the same time, it seems likely that African-Americans, Native Americans, and Hispanics will not see a significant improvement in their representation among Ph.D. recipients. ■

**Table 1. Ethnicity of U.S. and Canadian CS&CE Ph.D. Recipients**

Academic Year	Nonresident Alien	African-American, Non-Hispanic	Native American	Asian or Pacific Islander	Hispanic	White, Non-Hispanic	Other
1993-94	35%	1%	0%	16%	1%	44%	3%
1994-95	33%	1%	0%	15%	3%	39%	9%
1995-96	36%	1%	1%	16%	3%	40%	3%
1996-97	38%	1%	0%	12%	1%	45%	4%
1997-98	42%	1%	1%	10%	1%	44%	2%
1998-99	42%	2%	0%	9%	2%	42%	2%
1999-2000	47%	2%	0%	10%	2%	39%	1%

**Table 2. Ethnicity of U.S. and Canadian CS&CE Ph.D. Total Enrollment**

Academic Year	Nonresident Alien	African-American, Non-Hispanic	Native American	Asian or Pacific Islander	Hispanic	White, Non-Hispanic	Other
1993-94	37%	2%	0%	13%	1%	45%	2%
1994-95	35%	2%	0%	14%	2%	46%	2%
1995-96	36%	1%	0%	14%	2%	44%	4%
1996-97	45%	2%	0%	8%	2%	39%	2%
1997-98	46%	2%	0%	10%	2%	38%	2%
1998-99	45%	2%	0%	10%	2%	39%	2%
1999-2000	50%	2%	0%	10%	1%	34%	3%

## CRA Welcomes New Staff

CRA has recently hired two new employees, filling the vacancies created by the departures of Lisa Thompson (director of government affairs) and Jennifer Rubinstein (coordinator of women's programs) during the summer.

Peter Harsha <[harsha@cra.org](mailto:harsha@cra.org)> joins CRA as director of government affairs. He will be our principal contact in Washington on policy issues, working closely with the CRA government affairs committee chaired by Ed Lazowska (University of Washington). A major effort will be made to increase participation of computer scientists in the advocacy process. Peter will work on this goal with government affairs committee co-chair Jeff Vitter (Duke University). Efforts are also planned to increase the partnering of CRA and industry groups on policy issues of mutual concern.

Peter has a bachelor's degree in English from Hillsdale College. He has spent six years working for



Peter Harsha

Congressman Nick Smith (R-MI), the past two-and-a-half years directly in science policy as a member of the professional staff for the House Committee on Science, Subcommittee on Research. Legislative

issues on which he has worked include information technology policy and authorization, university-



Patrick McMullen

industrial partnerships, and NSF policy and authorization.

Patrick McMullen <[patrick@cra.org](mailto:patrick@cra.org)> has joined CRA as program associate. He will work primarily on projects that involve statistics and

use of social science methodologies, such as field work on our empirical studies of recruitment and retention, formal evaluation of effectiveness of CRA programs, and Taulbee and industrial salary surveys. He will also support a number of other programmatic efforts for some of our workshops and women's programs.

Patrick received a bachelor's degree from Mary Washington College in political science and a master's degree from Wake Forest University in communications. He did graduate study in electronic communications at Northwestern University, has work experience working in e-commerce, and taught for two years in the speech program at Mary Washington. ■

Expanding Pipeline  
from Page 2

Stehlik—ran two weeklong sessions in the summers of 1996, 1997, and 1998. The goal of the program was two-fold: 1) to prepare high school CS teachers to teach C++, a major component of the revised AP CS exam, and 2) to talk to teachers about the computing gender gap and what they could do about it.

During the course of the three summers, 240 teachers (approximately 16 percent of all AP CS high school teachers in the United States) participated in the program at CMU. Thus, it is likely that, both directly and indirectly, 6APT has played a significant role in the increased numbers of high school women considering majors in computer science at Carnegie Mellon. Indeed, preliminary data support this claim. The percentage of women from the 6APT high schools entering our undergraduate program increased from 0 in 1995 to 18 percent in 1999.

**Admissions**

Around 1995, Raj Reddy, then Dean of Computer Science, articulated to the Director of Admissions his desire to attract students to Carnegie Mellon who demonstrate the potential to be world leaders and visionaries in computer science. The CMU Admissions Office responded to Reddy's vision by expanding the range of qualities they looked for in CS applicants. In addition to demonstrated academic competence, the Admissions Office began giving more weight to non-academic factors, looking for applicants with leadership potential and a commitment to "give back to the community." These broadened criteria also became important in awarding financial aid.

About the same time, Allan Fisher also conveyed to the Admissions Office his goal of a gender-balanced program. He felt it was important to get the message out that "no prior programming experience is necessary" to enter the CMU computer science program. The image of a CS student as someone (usually male) who has played with computers since early childhood is widespread. This often discourages many otherwise talented students from applying to a CS program.

Admissions statistics (summarized in Table 1) indicate several important

trends at different stages in the admissions process:

- A steady rise in the numbers of both male and female applicants to the undergraduate program over the past five years, somewhat steeper for women than for men.
- A significantly higher proportion of women applicants being accepted each year.
- An increased yield among female applicants (now about 33%).

According to the CMU Office of Admissions, standardized scores have remained high (e.g., in 2001, the average math SAT score for entering students was 760), while measures of outside achievement and personal attributes are now at an all-time high.

Issues of retention must also be addressed, and efforts have been made to ensure a positive learning environment for women in the School of Computer Science.

**A Supportive Community: The Women@SCS Advisory Council**

The Women@SCS Advisory Council was created in fall 1999, and has since met weekly during the academic year. Membership includes undergraduates representing all four years and graduate students representing the various departments within SCS.<sup>7</sup> Council meetings, and ensuing conversations, whether in person or virtual (the Council logs voluminous email correspondence), determine the Council's priorities and evolving agenda for action. A top priority is community building.

**Community Building and Networking**

The most extensive single activity of the Women@SCS Advisory Council has been the Big Sister/Little Sister program, which pairs upper-class and graduate students with first-year and sophomore CS majors. It was formed to strengthen the bonds of women in SCS and encourage a forum for discussion, advice, and support. Thirty-four students participated in the Big Sister/Little Sister program during its first year, 48 during the second year.

Other community-building activities have included: student-faculty dinners, undergraduate-graduate

student dinners, dessert socials during exam periods, and group outings (e.g., to the Carnegie International Art Exhibit and the Pittsburgh Symphony). The Council also sponsors panels with visiting women computer scientists on topics such as "Women's Career Choices: Costs and Benefits Along the Way," "Grad School or Industry—What Should I Do?" and "The Joys of Undergraduate Research." A tradition begun at the end of the first year is the "Passing the Torch" dinner where seniors share their *pearls of wisdom*.

**Consulting and the Curriculum**

The Council also acts as a resource and sounding board for the faculty and administration about issues affecting undergraduates. These issues can be quite specific. For example, the Council has reviewed TA training videos and provided feedback to Associate Dean Peter Lee about recruitment presentations.

Even more, insights provided by the Council are likely to have a profound impact on the curriculum. In her "green paper" circulated at a meeting with faculty, senior Ting-Chih Shih clearly pointed out that the current CS undergraduate curriculum serves male students far better than females. For one, the entry programming courses favor students with more experience (usually men) who seem to get better scores effortlessly. As a result, many women "begin thinking that learning computer science takes innate talent and no amount of hard work will pay off... They start to lose confidence and forget their initial interest in computer science..." Moreover, the "way lectures are presented seems to appeal to men more. In general, females feel that the birds-eye view of a problem, and the end result, are more relevant than the coding details in between..."

**Outreach**

There is a large niche for educational activities geared towards engaging girls in science and technology. Council members have designed a workshop for middle school girls ("Is There a Robot in Your Future?") and have sponsored a national forum on "Girls, Technology and Education."

The Council has been, and continues to be, a source of information about women in computer science for the campus community and the community-at-large. The Women@SCS web site (<http://www.cs.cmu.edu/~women>) is a "must see" to get a feel for the enormous scope of our activities.

**Evaluation and Impact**

We believe the following features have been crucial to the success of our efforts so far:

- A vision articulated by key faculty and administrators stressing that a more diverse student body is not only good for potential students, but is crucial to the intellectual health and future of CMU's computer science program as well as the entire field.
- A solid base of research from which to make change and educate faculty and students, and a commitment to act.
- Respected and experienced researchers, faculty, and administrators at the helm of the effort, working to bring others on board.
- An articulate and committed group of women undergraduate and graduate students who have gained the recognition and respect of the faculty and administration.
- The growing reputation of CMU as a place that wants women and values their presence.
- Support from the President of the university that has enabled us to bring speakers to campus; organize events, workshops, and outreach activities; and send students to professional meetings.<sup>8</sup>

There is a growing perception among the faculty and administration that the student body is "more interesting than ever before." The awareness of pressing issues—such as the curriculum, advising, and climate—appears to be increasing, particularly among core faculty involved in undergraduate teaching and key administrators. We are witnessing a major transformation in the culture of computing.

**In Conclusion**

Increasing and maintaining the presence of women in computer science at levels equal to men necessitates taking a hard look at, and changing, business as usual. In the past, the culture, environment, and expectations of the undergraduate CS program have served male students better than female students, although it has not been optimal for many male students either. Many of the changes we have been advocating—particularly regarding curriculum, advising, pedagogy, and community—are not gender-specific. Many are applicable in other educational settings, for example in high

Expanding Pipeline  
Continued on Page 9

**Table 1. Computer Science Undergraduate Admissions Carnegie Mellon University 1995-2001**

Year	Applied		Admitted		Enrolled	
	Total	Women (% of all applicants)	Total (% of applied)	Women (% of female applicants)	Total	Women (% of total enrolled)
1995	1484	160 (11%)	382 (26%)	54 (34%)	96	7 (7%)
1996	2182	231 (11%)	479 (22%)	87 (37%)	142	23 (16%)
1997	2222	248 (11%)	481 (21%)	87 (35%)	136	18 (13%)
1998	2364	274 (12%)	462 (19%)	96 (35%)	140	27 (19%)
1999	2680	342 (13%)	454 (17%)	122 (36%)	130	50 (38%)
2000	2876	404 (14%)	386 (13%)	158 (39%)	132	51 (39%)
2001	3237	435 (15%)	402 (12%)	157 (36%)	132	49 (37%)

Source: CMU Office of Admissions (May 18, 2000); updated (September 10, 2001).

### CRA Honors Ruzena Bajcsy



At a CRA reception on August 28, friends and colleagues honored Ruzena Bajcsy at the end of her term as Assistant Director of NSF's CISE directorate. Pictured above are (l to r): CRA executive director, Bill Aspray; Dr. Bajcsy; and CRA board chair, Jim Foley.

### Transitions and Announcements

Ruzena Bajcsy has been appointed the new director of the Center for Information Technology Research in the Interest of Society (CITRIS) at the University of California, Berkeley. CITRIS is one of four California Institutes for Science and Innovation. It brings together the UC campuses at Berkeley, Davis, Merced, and Santa Cruz with private industry to develop innovative technology that tackles some of society's most pressing problems. Dr. Bajcsy, previously Professor of Computer and Information Science at the University of Pennsylvania, recently completed her term as Assistant Director of CISE at the National Science Foundation.

Stephen B. Seidman has been named Dean of the new College of Computing Sciences at the New Jersey Institute of Technology where he is Professor of Computer Science and Professor of Information Systems. He previously chaired the Department of Computer Science at Colorado State University.

George O. Strawn has been named Acting Assistant Director of the Directorate for Computer and Information Science and Engineering (CISE) at the National Science Foundation, effective September 2001. From January 1999 through August 2001 he was the Executive Officer of CISE.

### Rotators from Page 1

one of the many interdisciplinary and interagency priority areas that NSF is prompting (e.g., nanotechnology, biocomplexity, and interdisciplinary mathematics). It is important that CISE researchers are energized to participate in these opportunities, since they not only provide additional sources of support but also may lead to whole new areas of CISE research.

Third, you gain a useful overview of the federal research support process that can be useful for your own grantsmanship once you are back at the university. Moreover, for those interested in considering leadership roles at universities, this experience can be especially valuable.

Finally, Washington, DC is an enjoyable and stimulating place to live. The Smithsonian Resident Associates Program, just to name one thing, provides a great series of programs and lectures that can enrich your experience.

Once you are convinced that you should look into an IPA assignment at NSF, the next question is: How easy is it to do? Answer: NSF has procedures in place that make the whole process pretty easy. An IPA assignee who comes to work temporarily at NSF retains his or her status at the home institution. After you have been selected and have agreed to come, NSF makes a grant to your university toward your salary and benefits costs, negotiating cost

sharing with your university. You remain on your university payroll and maintain the continuity of your benefits programs.

Second, NSF provides a per diem allowance to help defray expenses. This allowance is currently about \$1,000 per month and is available for the two years of the typical tour of duty. NSF will also coordinate with you concerning arrangements should you need to continue your research commitments at the university while on assignment.

The actual move to the DC area involves a personal decision. There is an easier way and a harder way to do it, depending on personal circumstances (I did it the harder way both times). The easier way to move is to leave spouse and children guarding the home front and to lease an apartment in one of the many apartment buildings within walking distance of NSF. This way may be preferred by persons whose spouse is employed back home and/or whose children are at an "unmovable" age.

The harder way to move is to rent out your home and move your family to an appropriate rental house in the DC area. Finding a rental house can be done by getting the name of one or more real estate salespersons from fellow NSFers and scheduling a trip to scout the area to see what you like. Rental houses cannot be rented in advance, however. Look around a few months early if you like, but expect to rent the house you want as soon as you find it (or somebody else will grab it). In my case, even though

### PITAC from Page 1

researchers in this field are scattered across many disciplines with few opportunities to interact. Goals include finding ways to foster this interdisciplinary research field and increase its visibility, perhaps by providing opportunities such as workshops and an annual conference to bring the diverse researchers together.

The Software Subcommittee expressed satisfaction with the response to the 1999 report funding recommendations, with increases to NSF and to some mission agencies. Interagency collaboration and planning has been excellent, and ITR is making a big difference resulting in new kinds of projects, new collaborations (e.g., between biology and IT), and grants of various sizes and durations. However, there is a lack of risk-taking in proposals and many excellent proposals could not be supported for lack of funding. Progress has been made in sponsoring and encouraging multidisciplinary research, but it needs to be strengthened within IT.

The Scalable Information Infrastructure Subcommittee reported the agencies' responses to the PITAC recommendations. Agencies involved—NSF, DARPA, DOE, NASA, NIST, NOAA, and NSA—have implemented a large number of projects recommended by the 1999 report. There is evidence of increased interagency coordination,

and the Large-Scale Networking New Visions workshops continue to advance the research agenda.

Funding mechanisms have been broadened from small, single PI projects to medium and large multi-PI projects funded for multiple years.

The High-End Computing Subcommittee indicated satisfaction that progress has been made in achieving its recommendations. Examples include funding to build the Distributed Terascale Facility and a movement to RISC-based massively parallel processors (MPPs). Future considerations include the convergence of computing and communications, the continuation of Moore's Law with 10 GHz processors by the end of the decade, and sustained petaflop computing.

Paul Domich, representing the White House, reported that the confirmation hearing for John H. Marburger, III, nominated by the President to be Director of the Office of Science and Technology, was expected to take place in mid-October. Once the director and associate directors are in place, it is likely that the current vacancies on PITAC will be filled. Domich reported that most agency budgets (with the exception of DOD and HHS) are moving and have passed both House and Senate, but have not gone through conference.

Additional information about PITAC and its activities is available on its website at:

<http://www.itrd.gov/ac>. ■

it was "the harder way," my family had a good enough experience living in the DC area during my first tour of duty that they elected to come back with me a second time.

In summary, there are plenty of personal and research community benefits when a person rises to the opportunity of serving as a rotator with the Foundation. And the NSF procedures make the transition about as painless as possible. So I would encourage you to lend *your* support to the federal effort to support CISE research.

For more information check out <http://www.nsf.gov/home/chart/intergov.htm> regarding IPA assignments and <http://www.cise.nsf.gov> regarding CISE programs and PD openings. Also contact us personally: program directors, division directors, and the assistant director would all be happy to talk with you.

*Dr. Strawn is the Acting Assistant Director of CISE at NSF. Previously he served as the Executive Officer of CISE, which manages NSF's programs for computer science research and for the creation and use of advanced supercomputing and networking. From 1995 through 1998 he was Division Director of the CISE Division of Advanced Networking Infrastructure and Research. He currently serves as co-chair of both the interagency Large Scale Networking Working Group and the international Coordinating Committee for Intercontinental Research Networks. ■*

## Tapia Symposium a Success

More than 170 people attended the Richard Tapia Celebration of Diversity in Computing October 18-20 in Houston, Texas. The Coalition to Diversify Computing, a committee sponsored by CRA, ACM, and IEEE-CS, organized the inaugural event, which is designed to celebrate the technical contributions and career interests of diverse people in computing fields.

The symposium offered a mix of technical and non-technical talks, panels, and a poster session. An awards banquet honored Dr. Richard A. Tapia, a mathematician and professor in computational and applied mathematics at Rice University in Houston, who is well known for his commitment to educational equity, mentoring, and student success.

Speakers at the banquet included, Malcom Gillis, President of Rice University; Neal Lane, former Director of the White House Office of Science and Technology Policy; current and former students; car club friends; and Jean Tapia, who provided a moving tribute to her husband. Bryant York, Portland State University, was presented the inaugural "Richard A. Tapia Achievement Award for Scientific Scholarship, Civic Science, and Diversifying Computing." ■

Computer Engineering  
from Page 3

muddling of the data between computer engineering and computer science. To date, the EWC's standard approach has been to collect data on the number of students within each engineering college, regardless of program title, and then publish the data with program title details so that careful users can parse the information at the level of their choosing. However, the EWC's "computer" discipline has increasingly become confusing, since it includes nearly as many computer science students as computer engineering students. In fact, on close inspection, it is found that the computer discipline for the class of 2000 can be broken into these five subgroups (see table 1).

This is an issue the EWC will most likely address by splitting its broader computer discipline into, specifically, computer engineering and computer science. This may seem an obvious solution, but the issue is further muddled by the

large numbers of computer science students who study outside of engineering departments and will not be included in EWC surveys.

**Other Engineering Disciplines of Choice**

Of 22 disciplines tracked by the EWC, 10 engineering disciplines accounted for at least 1,000 freshmen each (see table 2). Three disciplines are dominant in size, with more than 12,000 freshmen each:

- Computer
- Electrical and electronics
- Mechanical

An intermediate group accounted for about 5,000 to 7,000 freshmen each:

- Civil
- Chemical
- General

And four other disciplines accounted for more than 1,000 freshmen each:

- Aerospace
- Industrial
- Bioengineering
- Engineering science

A very high number of freshmen engineering students—for example, 27,078 in 2000—are classified as pre- or other-engineering each year. Many engineering colleges require their freshmen to wait a year or two before declaring a major field of study; many students simply prefer to wait.

In 2000, an additional 4,183 engineering freshmen were spread throughout 12 other disciplines.

**Underrepresented Minority Numbers Worsen**

For the freshmen class in 2000, underrepresented minorities (African, Hispanic, and Native Americans) within the engineering freshmen class decreased as a proportion of the total class, dropping from 16.7 percent in 1999 to 16.1 percent

in 2000. Except for Native Americans, all the minority groups tracked by the EWC grew in number, yet the large overall growth simply outpaced the growth of African Americans and Hispanic Americans. Asian Americans and Foreign Nationals are continuing to grow both in number and percentage. The numbers of women grew significantly from 1999 to 2000 (by 1,225), but also decreased as a percentage of the total (see table 3).

Matt Doster ([mdoster@aaes.org](mailto:mdoster@aaes.org)) is the Director of the Engineering Workforce Commission, American Association of Engineering Societies, Washington, DC. The complete report, *Engineering and Technology Enrollments, Fall 2000*, may be purchased from the Engineering Workforce Commission by calling 888-400-2237 or visiting [www.aaes.org/ewc](http://www.aaes.org/ewc). ■

**Table 1**

Number of Students	SubGroups within Computer Discipline
9,247	Computer Engineering
128	Blend of Computer Engineering and Electrical Engineering
1,241	Blend of Computer Engineering and Computer Science
8,623	Computer Science, Software Engineering, Information Systems
72	Blend of Computer Science and Electrical Engineering

**Table 2. Student Increases by Disciplines Surveyed (2000)**

Discipline	Total Students	%Increase
Computer	19,311	33.1%
Electrical/Electronics	12,883	3.0%
Mechanical	12,806	5.0%
Civil	6,828	6.9%
General	6,376	-2.0%
Chemical	4,938	-4.8%
Aerospace	3,112	6.7%
Bioengineering	1,668	-5.8%
Industrial	1,443	0.6%
Engineering Science	1,147	0.1%
Architectural	732	23.9%
Materials	632	14.3%
Agricultural	557	13.0%
Marine/Naval Architecture	525	23.0%
Environmental	365	-9.4%
Petroleum	354	2.9%
Systems	331	-6.2%
Mining	259	25.1%
Engineering Management	143	7.5%
Manufacturing	130	-28.6%
Nuclear	106	0.0%
Ceramics	49	-44.3%
Pre- or Other-Engineering	27,078	6.1%

**Table 3. Population Groups as Percentage of Total**

	1999	2000
Women	19.2%	18.9%
African American	8.5%	8.0%
Hispanic American	7.5%	7.4%
Native American	0.7%	0.6%
Asian American	10.2%	10.9%
Foreign Nationals	4.4%	4.6%

**Note to Department Chairs re CRA Distributed Mentor Project**

Pending approval of NSF funding, the deadline for applications for the 2002 DMP program is expected to be **February 1, 2002**. Check the CRA website ([www.cra.org](http://www.cra.org)) for an announcement.

**COMPUTING RESEARCH NEWS**

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### Expanding Pipeline from Page 6

schools and in graduate programs. We believe they can benefit all students and the field as well.

*Lenore Blum is Distinguished Career Professor of Computer Science at Carnegie Mellon where she is faculty advisor to Women@SCS (lblum@cs.cmu.edu).*

### Notes

1. [http://www.mines.edu/fs\\_home/tcamp/cacm/paper.html](http://www.mines.edu/fs_home/tcamp/cacm/paper.html) "The Incredible Shrinking Pipeline," Tracy Camp, Colorado School of Mines. An edited version of this paper appears in *Communications of the ACM*, vol. 40, no. 10, pp. 103-110, Oct. 1997.
2. [http://www.mines.edu/fs\\_home/tcamp/new-study/new-study.html](http://www.mines.edu/fs_home/tcamp/new-study/new-study.html) "The Incredible Shrinking Pipeline Unlikely to Reverse," Tracy Camp, Colorado School of Mines; Keith Miller, University of Illinois at Springfield; and Vanessa Davies, Colorado School of Mines.
3. These are: the Center for Automated Learning and Discovery; Computer Science Department, which houses the undergraduate program; Entertainment Technology Center; Human-Computer Interaction Institute; Institute for Software

Research, International; Language Technologies Institute; and the Robotics Institute.

4. <http://cra.org/statistics> The Computing Research Association "Taulbee Survey."
5. [http://www.cs.cmu.edu/~gendergap/Women in Computer Sciences: Closing the Gender Gap in Higher Education](http://www.cs.cmu.edu/~gendergap/Women%20in%20Computer%20Sciences%20Closing%20the%20Gender%20Gap%20in%20Higher%20Education), Allan Fisher and Jane Margolis, School of Computer Science, Carnegie Mellon University.
6. <http://www.collegeboard.org/press/senior97/table14.html>
7. During its first year, eight undergraduate women, four graduate women, one faculty advisor, and one staff member served on the Advisory Council. Four additional students comprised the Women@SCS web team. Starting its third year, the Council had 14 undergraduate and 22 graduate student representatives.
8. In her article, "Toward Improving Female Retention in the Computer Science Major," *Communications of the ACM*, May 2001, J. McGrath Cohoon argues that, based on her investigation of Virginia's CS departments, "the characteristics and practices of computer science departments affect female retention at the undergraduate level" and that "inherent female characteristics are an insufficient explanation of women's underrepresentation in computer science." ■

### CSTB from Page 4

under which EmNets operate exacerbates the difficulties and poses hard problems for the research community.

If EmNets are to be designed in a principled way, rather than being assembled using techniques selected on a case-by-case basis and specialized to the system being built, computational models are needed that provide a conceptual framework in which the designs can be created, thought about, and tested. What makes developing the computational model for EmNets so challenging is, again, the combination of constraints under which they will be operating. Combining this with the mission- and, sometimes, life-critical nature of these systems makes the development of coherent computational models for these systems a high priority for the academic and industrial research communities.

### A Broad Research Agenda

The report outlines a broad-ranging research agenda that will begin to address the problems described above. Specifically, it outlines eight areas in which significant research is required before EmNets can fulfill their potential. Research in broadly relevant areas such as *networking* and *usability* that pervade many of the themes described below is also essential:

- *Predictability and manageability.* Methodologies and mechanisms for designing predictable, safe, reliable, manageable EmNets;
- *Adaptive self-configuration.* Techniques to allow adaptive self-configuration of EmNets to match volatile environmental conditions and system resources in an ongoing dynamic balance;
- *Monitoring and system health.* A complete conceptual framework to help achieve robust operation through self-monitoring, continuous self-testing, and reporting of system health in the face of extreme constraints on nodes and elements of the system;
- *Computational models.* New abstractions and computational models for designing, analyzing, and describing the collective behavior and information organization of massive EmNets;
- *Network geometry.* Ways to support and incorporate network geometry (as opposed to just network topology) into EmNets;
- *Interoperability.* Techniques and design methods for constructing long-lived, heterogeneous systems that evolve over time and space while remaining interoperable;
- *Integration of technical, social, ethical, and public policy issues.* Fundamental research into the nontechnical issues of EmNets, especially those having to do with the ethical and public policy issues surrounding privacy, security, reliability, usability, and safety;

- *Enabling technologies.* Ongoing research into the various component and enabling technologies of EmNets.

Along with significant work in the specific areas outlined above, progress in this area will require an inter- and multi-disciplinary approach on the part of broad communities of researchers. Keeping systems-level issues in mind, even when working on a specific aspect of the problem, will be essential. EmNets present exciting new challenges in information technology, posing fundamental research questions while being applicable to a broad range of problem domains and research disciplines. Without a concerted, comprehensive effort among and within relevant research communities, it is unlikely that the potential inherent in EmNets will be realized. Long-term, forward-thinking, and broad-ranging research programs are crucial to achieving a deep understanding of how to design and develop these systems. In addition to outlining a technical research agenda, the report also makes several recommendations to federal agencies, including the Defense Advanced Research Projects Agency (DARPA), the National Science Foundation (NSF), and the National Institute for Standards and Technology (NIST).

### Looking Forward

Future reports from CSTB will build on the issues raised in *Embedded, Everywhere*. An ongoing project on authentication technologies and their implications for privacy is studying issues of security and privacy in the context of authentication technologies. A large examination of privacy in the context of pervasive information technology is beginning. In addition, an exploration of the possibilities for interdisciplinary research between the geospatial information and computer science communities is under way.

The issues and research challenges articulated in *Embedded, Everywhere* aim to be broad and comprehensive and will undoubtedly arise in a variety of ways in a myriad of areas. The scope and breadth of the research problems that need to be solved make it clear that significant interdisciplinary research will be necessary, as approaches and models from a wide variety of disciplines can be brought to bear on the challenges of EmNets. Computer science researchers can take the opportunity presented by networked systems of embedded computers to both broaden and deepen their research programs to address the challenges of EmNets.

*Lynette I. Millett, a Program Officer at CSTB, was the study director of Embedded, Everywhere starting in September 2000. Copies of the final report may be purchased from National Academy Press at [www.nap.edu](http://www.nap.edu). Additional project information is available at [www.cstb.org](http://www.cstb.org).* ■

## FEBRUARY 12 DEADLINE FOR CRA SERVICE AWARD NOMINATIONS

The Computing Research Association invites nominations for the CRA Distinguished Service Award and the A. Nico Habermann Award for the year 2002. The awards will be presented at CRA's Conference at Snowbird July 14-16, 2002.

### Distinguished Service Award

CRA makes an award, usually annually, to a person who has made an outstanding service contribution to the computing research community. This award recognizes service in the areas of government affairs, professional societies, publications or conferences, and leadership that has a major impact on computing research.

### A. Nico Habermann Award

CRA makes an award, usually annually, to a person who has made an outstanding contribution to aiding members of underrepresented groups within the computing research community. This award recognizes work in areas of government affairs, educational programs, professional societies, public awareness, and leadership that has a major impact on advancing these groups in the computing research community.

For a list of previous winners of these awards, see: <http://www.cra.org/main/cra.awards.html>

### Nomination Procedure:

The deadline for receipt of nominations is **February 12, 2002**. Nominations should not exceed two pages in length and should describe the contributions on which the nomination is based. Letters in support of the nomination are welcome but not required. Questions or comments may be addressed to [awards@cra.org](mailto:awards@cra.org).

Send nominations electronically to: [awards@cra.org](mailto:awards@cra.org) (in plain ASCII text or as a Word attachment). Alternatively, mail or fax to:

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Fax: 202-667-1066  
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<http://www.cra.org/main/cra.awards.html> ■

Graphical Models  
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In the loosest of terms, a speech recognition system [1] can be deconstructed into four stages: signal processing, acoustic, pronunciation, and language modeling. In the first stage, the acoustic speech waveform is (deterministically) transformed and compressed into a series of feature vectors. In the second stage, probability distributions are created, within the event space of feature vectors, for each component of a word (such as a phone). The third stage consists of using a statistical model of likely pronunciations of each word. And lastly, the fourth stage utilizes a statistical model of likely strings of words. The latter three of the stages together can be described by a hidden Markov model (HMM). First proposed for speech recognition in the 1970s by researchers at IBM and AT&T research, HMMs are still the predominant statistical methodology used for speech recognition.

While much research in the past 20 years has attempted to move beyond the HMM, none of the techniques proposed so far is as powerful as graphical models. Graphical models (GMs) [2,3] are a flexible statistical abstraction that have been successfully used to describe problems in many domains, ranging from medical diagnosis and decision theory to time-series prediction and signal coding. Intuitively, they generalize many techniques used in statistical analysis and signal processing such as Kalman filters, auto-regressive models, and many information-theoretic coding algorithms. They provide a formal, visual, and graphical language with which one may observe and reason about important properties of random processes (and the underlying physical phenomena these processes represent). They also provide a set of computationally efficient decision-making algorithms. Overall, GMs encompass a vast family of statistical techniques.

GMs provide an excellent formalism within which to study, understand, and advance speech recognition. Many existing ASR techniques appear to be representable using GMs; apparently no other known abstraction possesses this property. With GMs, one may quickly evaluate and understand algorithms that otherwise might require a much longer time; and discussing and examining fundamentally different algorithms is relatively simple. It can be possible to eliminate a novel, initially promising statistical approach without much programming effort, if it is found to misrepresent that which is important. Moreover, staying within the GM formalism reduces the chance of accidental probabilistic errors. Even though the set of algorithms currently used for ASR is large, this collection occupies a remarkably small area within GM algorithm space. Because so many existing ASR successes lie within this vastly under-explored space, it is likely that a

systematic study of GM-based ASR algorithms could lead to new, more successful approaches.

While space limitations for this article allow only the most superficial coverage of what graphical models can offer, the following will touch on some of the critical advantages they provide for ASR. One of the most important properties of a collection of random variables is the notion of conditional independence. In particular, suppose that A, B, and C are random variables. If knowledge of A cannot influence B in any way, it is said that A and B are independent. Now, given knowledge of C, if A still cannot influence B in any way, it is said that A and B are conditionally independent given C. Conditional independence is different from independence—that is, if A is independent of B, then A might or might not be conditionally independent of B given C, and vice versa. Conditional independence is an extremely powerful concept. When conditional independence changes, a statistical model can undergo enormous simplifications. Formal properties of conditional independence are described in [2,3].

A graphical model is a graph where nodes correspond to random variables, and edges encode the set of conditional independence properties existing amongst those variables. Why is this useful? First, it provides a method with which one may visually explore the statistical structure of natural signals and scenes (such as speech) when represented as a graph. For example, graphs could show anything from causal relations between high-level concepts down to the fine-grained dependencies existing within the neural code. Second, GMs provide a formal mechanism to evaluate the implications of statistical assumptions made about a physical process. These implications are often not immediately obvious. Third, GMs provide a set of efficient algorithms for statistical decision-making. The algorithms, which correspond to valid manipulation of probabilistic equations, involve manipulations of the graphs themselves, and are therefore easy to apply irrespective of the particular graph being used. Finally, GMs provide a way to explore the implications of approximation, regarding both the process of decision-making (inferential approximation) and approximating a physical process itself.

When a new statistical model is used in an ASR system, it is typically fixed and has been created based on assumptions about the nature of speech. An interesting benefit provided by GMs is that the model itself can be tailor-made, based on properties measured within speech data, to match only the important dependencies extant within that data. This has been called GM structure learning, since it is the graph itself that is learned.

Accordingly, a GM can be minimally designed so that that it has representational power only where needed. Such structure learning will concentrate only on those things

that will help the recognition task, which means that the structure should reflect only those properties that help to distinguish one spoken utterance from potentially confusable utterances, a concept entitled structural discriminability [4]. Such GM-based systems can have smaller memory and computational demands than more naively designed systems. A GM-based system can therefore satisfy the principle of parsimony by being accurate and finely tuned to the task at hand.

To deploy a GM as a speech recognition system requires a great deal of programming effort. In order to ameliorate this problem, the author and a colleague at IBM research have been developing a new software toolkit for graphical models [5] specifically optimized for speech recognition and time series modeling tasks. The toolkit, aptly entitled the graphical models toolkit (or GMTK), provides a simple graphical programming language, and combines many features found both in existing speech recognition and graphical models software packages. With GMTK, it is possible to quickly specify a model structure and test it on very large speech data sets. The first version of the toolkit will be released, in open source form, early next year, and will be available from the author's WWW home page.

Indeed, automatic speech recognition has come a long way since the era when the Hal 9000 was first

imagined, but a long road lies ahead before such an ability will exist. Perhaps graphical models will play an important role in this important endeavor.

Jeff A. Bilmes is an Assistant Professor in the Department of Electrical Engineering at the University of Washington. Email: bilmes@ee.washington.edu. URL: <http://www.ee.washington.edu/faculty/bilmes>

The CRA Digital Government Fellowship is supported by the National Science Foundation's Digital Government Program, and is intended to build ties between academic and industrial computing research communities and information technology workers in federal, state, and local governments.

#### Notes:

1. Steve Young, "A Review of Large-vocabulary Continuous-speech Recognition," *IEEE Signal Processing Magazine*, 1996.
2. Steffan Lauritzen, "Graphical Models," *Oxford Science Publications*, 1996.
3. Judea Pearl, *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference*, Morgan Kaufmann, 1988.
4. Jeff A. Bilmes, "Dynamic Bayesian Multinets," *Proceedings of the 16th conf. on Uncertainty in Artificial Intelligence*, Morgan Kaufmann, 2000.
5. Jeff A. Bilmes and Geoff Zweig, "The Graphical Models Toolkit," forthcoming. ■

## DEPARTMENT CHAIRS AND LABS/CENTERS MANAGERS: SNOWBIRD ALERT

Mark your calendars now for CRA's Conference at Snowbird 2002! This biennial event is a "must" for department chairs and managers of labs and centers. The planning committee is putting together a stimulating program of speakers and workshops, which will also include a workshop for new chairs.

The dates are **July 14, 15, and 16, 2002** in Snowbird, Utah. Refer to future issues of *CRN* and, beginning in January, to the CRA website (<http://www.cra.org>) for program details and instructions for registration and accommodations.

If you would like to suggest a topic for the program, please contact either of the co-chairs. Members of the program committee include:

#### Academic Sessions:

Leah Jamieson, Co-Chair <lhj@ecn.purdue.edu>	Purdue University
Oscar Garcia	Wright State University
Tom Henderson	University of Utah
Jack Stankovic	University of Virginia
Frank Tompa	University of Waterloo
Roger Webb	Georgia Institute of Technology, ECEDHA

#### Labs/Centers Sessions:

Philip Bernstein, Co-Chair <philbe@microsoft.com>	Microsoft Research
Ronald Brachman	AT&T Labs
James Horning	InterTrust Technologies
Richard Waters	Mitsubishi Electric Research Labs

Other programmatic questions should be directed to Jean Smith ([jean@cra.org](mailto:jean@cra.org)).

## Drexel Student Receives Undergraduate Award



On August 9, CRA board member, David Waltz, President NEC Research Institute, presented Lisa Anthony, Drexel University, with the female 2001 CRA Outstanding Undergraduate Award at the International Joint Conference on Artificial Intelligence in Seattle.

Credit: Andrew Buchanan, Subtle Light Photography

**UBIQUITY****Grace Hopper Celebration of Women in Computing  
2002 Conference**

Hyatt Regency Vancouver, British Columbia, Canada  
October 9-12, 2002

Details: <http://gracehopper.org>

CRN  
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productive research projects and imposes family hardships. On the other hand, however, it creates opportunities to have an impact on a broader level, allows one to develop new sets of skills, and can expose a family to unparalleled cultural opportunities and historical venues.

Ruzena Bajcsy has challenged CRA to help educate the computing research community about the many reasons to "go to Washington." We have, in turn, invited several of our colleagues to pen CRN articles about their own experiences in Washington, which will appear in future issues of CRN.

In this issue you will see an article by George Strawn, Acting Assistant Director of CISE, who describes his own experiences and discusses the administrative mechanisms and processes involved in undertaking a stint in Washington. Please read the articles as they appear, and thoughtfully consider spending two years in Washington!

In the September issue of CRN I recounted the accomplishments of CRA since it was founded in 1972. I would like to acknowledge the community service of Ed Lazowska (University of Washington), who in June completed two successive two-

year terms as CRA Chair, and of three board members whose terms ended: Sandra Baylor (IBM Santa Teresa Laboratory), Barbara Ryder (Rutgers University), and Sid Karen (UC San Diego). Without their help, and that of many other volunteers and staff, CRA would not be in the enviably strong position we enjoy today. Thank you Ed, Sandra, Barbara, and Sid!

Another opportunity for community service will be coming soon. In January, CRA will be inviting the heads of our member academic departments and research labs to submit nominations for positions on the CRA board. Please tell your department or lab head of your interest in serving. Volunteers are also actively serving on CRA committees. We currently have 16 board committees, of which approximately 50 additional volunteers are members (committee memberships are listed at <http://www.cra.org/main/cra.people.comm.html>). This is yet another way to serve the research community.

The computing research community is effective for two reasons: great researchers, and great researchers who are willing to give some of their time to serve the research community. Think about it. Then do it. Stepping up to the challenge will be one of the most rewarding phases of your professional career. ■

**Sponsors—CRA Snowbird Conference 2002**

Our thanks to Microsoft Research and Telcordia Technologies for signing sign up early as Snowbird sponsors. If your organization would like to become a sponsor, we encourage you to contact Jay Vegso at CRA ([jvegso@cra.org](mailto:jvegso@cra.org)) for details.

## NSF Honors Computer Scientists for Distinguished Teaching

The National Science Foundation recently announced the recipients of the first "Director's Awards for Distinguished Teaching." Among those honored were Leah H. Jamieson, Professor of Electrical and Computer Engineering at Purdue University, and Joseph O'Rourke, Olin Professor of Computer Science at Smith College.

The awards represent NSF's "highest honor for excellence in both teaching and research." The five men and two women selected each will receive \$300,000 over four years to continue and expand their work beyond their institutions. The recipients will be honored at a ceremony on November 8 at the National Academy of Sciences in Washington, DC.

Professor Jamieson, a current CRA board member who recently

completed a two-year term as secretary, co-founded a center for Engineering Projects in Community Service at Purdue. Her project will create an interdisciplinary faculty team to engage teams of students in long-term, multidisciplinary endeavors that solve technology-based problems faced by not-for-profit community agencies.

Professor O'Rourke is a leader in supporting women to pursue careers in computer science. He made a major contribution to CRA in preparing the proposal submitted to NSF to fund CRA-W's successful Distributed Mentor Project, which began in 1994 and continues today. O'Rourke will take his recent research in computational geometry into classrooms from 6th grade upward, connecting the physical models to real-world problems. ■

## CRA Plans Three Workshops

CRA will hold another of its highly successful academic careers workshops for new faculty and advanced graduate students in computer science, computer engineering, computational science, and other computing-related disciplines on **February 10-12, 2002**.

The workshop, chaired by CRA board member, Lori Clarke (UMass—Amherst), focuses on practical methods for having a successful and fulfilling academic career. Topics include selecting and managing a research project, preparing a tenure dossier, mentoring and managing students, time management and family issues, and writing a successful research-funding proposal.

The workshop will include talks by senior members of NSF, DARPA, and the Office of Naval Research, as well as a session by NSF staff on how to write a good funding proposal.

For graduate students who wish to attend and whose departments are unable to provide support, CRA can offer approximately 20 scholarships. Preference will be given to students who have passed their qualifying exams. Since these are limited in number, please check with your department before you apply for one of CRA's scholarships.

This popular workshop will be held at the Key Bridge Marriott Hotel in Arlington, Virginia (Washington, DC area). Those wishing to attend should register without delay. Registration is already brisk, and it will be limited.

Workshop details are available at: <http://www.cra.org>

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The Computing Research Association Committee on the Status of Women in Computer Science and Engineering (CRA-W) will sponsor a career/mentoring

workshop entitled "Managing the Academic Career for Faculty Women at Undergraduate Computer Science and Engineering Institutions." It will take place at SIGCSE 2002 on Wednesday, **February 27**, from 8:30 am to 5 pm. SIGCSE is the Special Interest Group in Computer Science Education, one of many Special Interest Groups sponsored by ACM.

The workshop will provide faculty members at all levels of undergraduate education with critical information and tools to build successful academic careers. In addition, the workshop will afford mentoring activities targeting women in undergraduate teaching and research who face particular challenges in pursuing and maintaining academic careers at primarily undergraduate academic institutions.

This day-long workshop is structured as a set of whole-group panel sessions, parallel panel sessions, and formal and informal group activities. Workshop sessions will concentrate on providing mentoring advice by experienced women professors. In addition, sufficient time will be allowed for audience participation and dialogue focusing on issues from a woman's perspective, making connections with colleagues, and managing workloads by using available resources that may be as yet unknown to everyone.

The workshop is co-chaired by Sheila Castaneda (Clarke College) and Joan Francioni (Winona State College). Details will be available on the CRA-W website at: <http://www.cra.org/Activities/craw/>

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With support from the National Science Foundation, the Computing Research Association will sponsor its Workshops  
Continued on Page 24

## Professional Opportunities

## CRN Advertising Policy

See <http://www.cra.org/main/cra.jobshow.html>**Ben-Gurion University**

Department of Computer Science

The Computer Science Department at the Ben-Gurion University of the Negev in Israel invites applications for tenure track positions at all levels.

Candidates must have a Ph.D. in computer science or a related field and demonstrate excellence in research and teaching. Candidates in all areas of computer science will be considered.

The Department offers B.Sc., M.Sc., and Ph.D. degrees in Computer Science. It has 20 full-time faculty members, and is currently undergoing a significant expansion with a large increase in the number of faculty members and resources. Faculty members enjoy a research oriented atmosphere with moderate teaching loads and are encouraged to interact with the burgeoning high technology industry in Israel.

Applications, including resume and the name and address of at least three references (please indicate E-mail addresses) should be sent to:

Prof. Klara Kedem, Chair  
Dept. of Computer Science  
Ben-Gurion University  
P.O.Box 653  
Beer-Sheva, 84105, ISRAEL  
Email: [klara@cs.bgu.ac.il](mailto:klara@cs.bgu.ac.il)

**Brooklyn College**

The City University of New York (CUNY)

The Department of Computer and Information Science (CIS) is seeking to fill three tenure-track vacancies at either the Assistant or Associate Professor level. We are an urban liberal arts college, and our department has 22 full-time faculty, over 700 undergraduate majors, over 200 Master's students and over 20 affiliated doctoral students of the CUNY Graduate Center. Several major research projects are currently underway. Extensive faculty and student SUN/UNIX and PC networks are used in teaching and research.

We would prefer to hire three individuals, two specializing in any area of computer science, and a third specializing in multimedia computing.

A successful candidate will teach undergraduate and/or graduate courses in CIS and is expected to develop a research program in the field. He or she should have a broad knowledge of computer science and should have good teaching skills. The multimedia specialist will also help develop multimedia curricula for the College. For appointment as an Assistant Professor, a candidate for the first position should have a Ph.D. in computer science or a related area. For the second position, a candidate should have a Ph.D. in an area relevant to multimedia computing and significant experience in the field. For appointment as an Associate Professor, a preferred candidate should also have a record of participation in research grants and high-quality research in the field.

Please send a CV and three letters of reference to:

Aaron Tenenbaum  
Dept. of CIS, Brooklyn College  
2900 Bedford Avenue  
Brooklyn, NY 11210  
[tbaum@sci.brooklyn.cuny.edu](mailto:tbaum@sci.brooklyn.cuny.edu)

Please indicate whether you are applying for the Assistant or Associate Professor position and whether you are applying for the computer science or the multimedia computing position. Please include your email address and a phone number. Review of applications will begin October 21 and will continue until positions are filled. EOE/AA/IRCA/ADA.

**Brown University**

Division of Engineering

*Faculty Position in Computer Engineering*

The Division of Engineering at Brown University announces a tenure-track or tenured faculty position in Electrical Sciences and Computer Engineering. The appointment may be made at the level of Assistant, Associate or Full Professor depending on the qualifications of the candidate selected.

Qualifications include a Ph.D. or equivalent degree in Electrical Engineering, Computer Engineering or Computer Science with a strong engineering background, and significant research accomplishments in an appropriate area of computer engineering. Areas of special interest include computer systems and architectures, digital VLSI systems and CAD, real-time computing, embedded systems, architectures for signal/image processing or communications/networking, and other related areas. The appointee will be expected to be an important contributor to an active research program in computer engineering at Brown and be able to collaborate with existing faculty. The appointee will be expected to teach undergraduate and graduate courses in the appropriate area of specialty in Computer Engineering as well as in the core curriculum of the Division. The ability to make clear and

effective presentations of scientific material is required. Appointment at the level of Associate Professor or Professor would require a record of achievement in research that is commensurate with holding such rank at major research universities. Award of tenure requires demonstration of excellence in teaching as well as research.

Applicants should send a resume in hard copy form and have at least three (five for a senior level appointment) referees send letters of recommendation to:

Professor Harvey F. Silverman  
Search Committee Chair  
Division of Engineering  
Box D, BROWN UNIVERSITY  
Providence, RI 02912

Inquiries may be addressed to:

Tina Trahan@brown.edu. This is an open search with no deadline; however, the search may close without notice, at any time. Brown University is an equal opportunity/affirmative action employer and strongly encourages applications from women, minorities, and protected persons.

**Brown University**

Division of Applied Mathematics

The Division of Applied Mathematics at Brown University seeks applicants for a position at the Assistant or Associate Professor level, in the general areas of statistics and probability. See the Division web site at [www.dam.brown.edu](http://www.dam.brown.edu) for a full posting.

Brown University is an Affirmative Action/Equal Opportunity employer. Women and minorities are encouraged to apply.

**Bucknell University**

Department of Computer Science

Applications are invited for two tenure track assistant professor positions beginning mid-August, 2002. A Ph.D. in Computer Science or Computer Engineering and evidence of commitment to excellence in teaching and research are required. Must have interest in participating in the teaching and the ongoing development of one or more of the required curriculum areas including the introduction to computer science sequence, computer organization, programming languages, data structures, operating systems, and architecture. Excellent salary and fringe benefits. Position 1: Requires primary ongoing participation in the offering and development of the required programming languages course and electives in that area of programming languages. Research should be in the area of programming languages.

Position 2: Requires ongoing participation in required courses. The position should help us expand our elective offerings. Research area is open.

Bucknell is a highly selective private undergraduate institution. The Department of Computer Science currently has nine full-time faculty. The programs are accredited by both ABET and CSAB. More information about the program is found at <http://www.eg.bucknell.edu/csci>. The computing environment for instruction and research is based on 70 SUN Ultra 4 workstations.

Applications will be considered as received and recruiting will continue until the positions are filled. Please send a resume, graduate transcript (photocopy acceptable), and the name of three references to:

Gary Haggard, Chair  
Dept. of Computer Science  
Bucknell University  
Lewisburg, PA 17837

Bucknell encourages applications from women and members of minority groups (EO/AA).

**California Polytechnic State University, San Luis Obispo**

Computer Engineering Program

*Tenure Track Faculty Positions*

The Computer Engineering Program, Cal Poly State University, San Luis Obispo, invites applications for full-time, academic year tenure-track faculty positions, at the assistant through full professor levels, starting during 2002 or a mutually acceptable date. Four positions are open, including two Bert and Candace Forbes Endowed Professors of Computer Engineering. Duties include teaching undergraduate and graduate courses and laboratories, and research. This position offers the opportunity to participate in the continuing development of the Computer Engineering Program, a joint program sponsored by the Electrical Engineering and Computer Science Departments. Tenure will be in either department, salary and rank is commensurate with qualifications and experience. Candidates must have a strong commitment to teaching, dedication to professional development and scholarship, and broad-based knowledge of computer engineering, with emphasis on computer architecture, microprocessor-systems, networks, operating systems, advanced chip-level design, or similar area. Ph.D. in

Computer Engineering, Electrical Engineering, or Computer Science required. Demonstrated ability in written and oral use of the English language required. For information and application, please contact:

Art MacCarley, Director  
Computer Engineering Program  
Cal Poly  
San Luis Obispo, CA 93407  
Tel. (805) 756-1229

e-mail: [amaccarl@calpoly.edu](mailto:amaccarl@calpoly.edu) Refer to Recruitment Code 3797.

Resumes can be submitted via email as text documents, or as PDF or MS-Word attachments. Review of applications will begin December 1, 2001; applications received after that date may be considered. Cal Poly is strongly committed to achieving excellence through cultural diversity. The university actively encourages applications and nominations of women, persons of color, applicants with disabilities, and members of other under-represented groups. AA/EEO.

**Clemson University**

Computer Science

*Faculty Positions*

The Department of Computer Science at Clemson University has multiple openings for tenure-track faculty positions at all levels as well as lecturers. Outstanding candidates in all areas of Computer Science are encouraged to apply. Current faculty interests include algorithms and theory, graphics & visualization, networking and systems, programming languages, and software engineering. Applicants for the tenure-track positions should have a Ph.D. in computer science or a related field. Applicants for the lecturer positions should hold an M.S. in computer science and should be committed to high quality undergraduate instruction. The Department has 21 faculty members, about 600 undergraduate majors, and over 100 graduate students. In addition to B.A., B.S., M.S. and Ph.D. degrees in Computer Science, the department also offers inter-disciplinary degrees in E-Commerce and Fine Arts in Computing. Clemson University is the land-grant university of South Carolina and has an enrollment of approximately 17,000. The University is located in Clemson, South Carolina, a small college town on beautiful Lake Hartwell at the foothills of the Blue Ridge Mountains. The area offers numerous outdoor activities. For additional details, please see [www.cs.clemson.edu](http://www.cs.clemson.edu). Electronic applications (preferably in PDF), including names of three references, may be sent to [search@cs.clemson.edu](mailto:search@cs.clemson.edu). If unavoidable, hard copies may be mailed to:

Faculty Search Committee  
Department of Computer Science  
Clemson University  
Clemson, SC 29634-0974

Applications will be accepted and screened periodically beginning September 1, 2001. The search will continue until the positions are filled. Clemson University is an Affirmative Action/Equal Opportunity Employer.

**College of Charleston**

Assistant or Associate Professor of Computer Science

The College of Charleston Department of Computer Science invites applicants for a tenure-track position at the assistant professor level. The department is especially interested in adding in the areas of networks and software architecture. A Ph.D. in computer science, computer engineering or software engineering is required. The successful candidate should demonstrate a commitment to quality undergraduate teaching, and show potential for sustained scholarly activity that complements teaching. The starting nine-month salary range is highly competitive. Startup funds and space are also provided.

Review of applications will continue until position is filled. Please send your curriculum vitae, statement of teaching philosophy or teaching portfolio, and the names and e-mail addresses of three professional references to [csdept@cs.cofc.edu](mailto:csdept@cs.cofc.edu) via attachment or URL. If you prefer not to apply electronically, please mail your application to:

Dr. Christopher Starr, Chairman  
Department of Computer Science  
College of Charleston  
66 George Street  
Charleston, SC 29424

For more information about our department and this position see [www.cs.cofc.edu](http://www.cs.cofc.edu). The College of Charleston is an Affirmative Action, Equal Opportunity Employer and welcomes applications from women and minorities.

**College of Mount St. Joseph**

Computer Science

*Faculty Position*

The College of Mount St. Joseph, a Catholic, liberal arts college located in suburban Cincinnati, is accepting applications for a full-time, tenure-track faculty position in the Department of Mathematics and Computer Science available in August 2002. A successful candidate will have a Ph.D. in computer science or a closely related field, a Commitment

## COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

## THE UNIVERSITY OF TEXAS AT ARLINGTON

The University of Texas at Arlington (UTA), Computer Science and Engineering (CSE) Department - CSE@UTA invites applications for multiple tenure-track faculty positions at all levels. However, preference will be given to positions at assistant or associate professor levels. All areas of computer science will be considered, including: software engineering; multimedia and video processing; bio-informatics; pervasive computing; intelligent systems; networks and telecommunications; database and data mining; and applied theory. UTA, part of The University of Texas System, is located in the heart of the rapidly growing Dallas/Fort Worth area, one of the nation's largest high-technology regions, with a flourishing industrial base and excellent opportunities for industry/university collaboration.

We at CSE@UTA are committed to excellence in research, teaching, and service. Last year we kicked off a "Top 25 Initiative" with the goal of reaching a national top 25 ranking. The initiative is strongly supported by all CSE@UTA stakeholders including the UTA administration, our students and alumni, and our industry partners. The highlights of the Top 25 Initiative include significant increase in tenure track faculty positions and PhD students; significant increase in research funds; and establishment of endowed student fellowships, endowed faculty chairs, and industry-sponsored laboratories.

Applicants must have an earned doctorate in computer science, computer engineering, or closely related fields and a commitment to teaching and scholarly research. Applicants are expected to have an excellent record of professional accomplishments, commensurate with their level of experience. The faculty openings are anticipated for September 2002. Screening of applications will begin immediately and will continue until all positions are filled. Interested persons should send a resume and reference letters to:

Dr. David Kung, Chair of Search Committee  
Department of Computer Science and Engineering  
P.O. Box 19015  
For overnight express: 416 Yates St., NH300  
Arlington, TX 76019-0015

Phone: 817-272-3605  
FAX: 817-272-3070  
Email: [search@cse.uta.edu](mailto:search@cse.uta.edu). <http://www.cse.uta.edu>.

The University of Texas at Arlington is an Equal Opportunity/Affirmative Action Employer.

## Professional Opportunities

to teaching excellence, and strong written and verbal communication skills. Faculty expectations include student advising, curriculum development, scholarly activity, and committee service. Applicants should send a letter of interest; vita with copies of graduate transcripts; a statement addressing the applicant's teaching interests and scholarship goals in a liberal arts environment; and three current letters of recommendation describing teaching experience and abilities. Applicants will be notified by e-mail when their files are complete. A review of resumes will begin immediately and continue until identification of the appropriate candidate. Send application materials to:

Dr. Scott Sportsman  
Dept. of Mathematics and Computer Science  
College of Mount Saint Joseph  
5701 Delhi Road  
Cincinnati, Ohio 45233

For general information about the college and specific information about the department, visit web site [www.msj.edu](http://www.msj.edu).  
EOE

### Colorado State University

Computer Science Department

#### Department Chair

Colorado State University invites nominations and applications for the position of Chair of the Computer Science Department. Anticipated starting date is July 1, 2002. Candidates for this position must have a Ph.D. in Computer Science or related field, an excellent record in teaching, a well-regarded research program with broad based funding and be qualified for an appointment as a full Professor. Prior administrative experience is desirable.

The Computer Science Department has 750 undergraduate majors and 100 graduate students in its M.S. and Ph.D. programs. The department currently has 18 regular faculty engaged in state, federal and corporate funded research in the areas of artificial intelligence, software engineering, parallel processing, networking and security. Please send a vita and names, addresses, telephone numbers, and e-mail addresses of five references, or a letter of nomination to:

Professor Richard A. Davis, Chair Search Committee  
College of Natural Sciences  
117 Statistics Building  
Colorado State University  
Fort Collins, Colorado 80523

Screening of applications will begin November 19, 2001 and will continue until the position is filled. Questions and inquiries can be sent via e-mail to [chair-search@cs.colostate.edu](mailto:chair-search@cs.colostate.edu)

Colorado State University is an EEO/AA employer. Equal Opportunity Office: 101 Student Services.

### Colorado State University

Computer Science Department

#### Tenure-Track Faculty Position

The Department of Computer Science at Colorado State University solicits applications for a tenure-track faculty position, beginning Fall 2002. The appointment will be preferably made at the level of assistant professor, but appointment at a more senior level is also possible for candidates who can demonstrate a strong connection to ongoing department research. Applicants must have a Ph.D. in computer science, computer engineering, or a related field. Applicants will be expected to teach undergraduate and graduate courses, and they must demonstrate potential for excellence in research and teaching.

The Computer Science Department has over 700 undergraduate majors and 105 graduate students enrolled in Master's and doctoral programs. The department currently has 17 tenure-track faculty, with strong research programs in artificial intelligence, software engineering, and parallel and distributed computation. Computer facilities are excellent, and there are ample opportunities for research collaborations with local industry. Colorado State University, with an enrollment of 23,000 students, is located in Fort Collins, Colorado, an attractive community of over 100,000 people, at the base of the Front Range of the Rocky Mountains, 65 miles north of Denver. The northern Front Range offers a wide range of outdoor recreational activities. More information about the department and its research programs can be obtained from the department home page at <http://www.cs.colostate.edu>

Applicants should send a curriculum vitae and letters from at least three professional references to:

Faculty Search Committee  
Computer Science Department  
Colorado State University  
601 South Howes, Room 211  
Fort Collins, Colorado 80523-1873

Please include a statement indicating how your background and interests match the expectations of the position described above. The department's telephone number is (970) 491-5862, Fax number is (970) 491-2466, and email inquiries should be directed to [faculty-search@cs.colostate.edu](mailto:faculty-search@cs.colostate.edu). Screening of applications will begin January 1, 2002 and continue until the position is filled.

Colorado State University is an EEO/AA employer. Office of Equal Opportunity: 101 Student Services.

### Dalhousie University

Faculty of Computer Science

Dalhousie University invites applications for tenure stream and contractually limited positions at all levels, within the Faculty of Computer Science, which currently has 27 faculty positions and approximately 620 undergraduate majors and 260 master's and doctoral students. The Faculty recently moved to a new, dedicated building, and initiatives are under development involving multidisciplinary research projects with university and industry partners. For example, a Master of Electronic Commerce degree is now offered in collaboration with the Faculties of Law and Management. Further expansion of Computer Science is a priority for the University.

Dalhousie University is located in Halifax, Nova Scotia, which is the largest city in Atlantic Canada and affords its residents outstanding quality of life.

The Faculty pursues a strong research program in the following areas: Software Engineering and Applications, Data Collection, Storage and Analysis, Communications and Networks, Theory and Algorithms, Network \& New Media Applications. Application areas include electronic commerce and computers in medicine. The opportunity exists for faculty members to participate in industrially sponsored research through the Global Information Networking Institute University Services Inc. (GINUS).

The Faculty is interested in outstanding candidates from all areas of computer science; however, preference will be given to candidates interested in network centric computing, software engineering, and related areas, such as networking, HCI, or distributed applications. Successful candidates will be encouraged to establish connections with industry.

Applicants should have a Ph.D. in Computer Science, although a Ph.D. in a related area may be considered. Evidence of strong commitment to and aptitude for research and teaching is essential. Rank and salary will be commensurate with qualifications.

Applications should include a curriculum vitae and the names and complete addresses of three references, and should be sent to the address below. Applicants should arrange for their referees to forward letters of reference directly to the same address.

The Chair, Appointments Committee  
Faculty of Computer Science  
6050 University Avenue  
Dalhousie University  
Halifax, NS Canada, B3H 1W5  
E-mail: [appointments@cs.dal.ca](mailto:appointments@cs.dal.ca)

Applications will be accepted until all available positions are filled. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Dalhousie University is an Employment Equity/Affirmative Action employer. The University encourages applications from qualified Aboriginal peoples, persons with a disability, racially visible persons, and women.

### Dartmouth College

Department of Computer Science

The Department of Computer Science anticipates hiring one or more Assistant Professors of Computer Science. We are particularly interested in candidates in the areas of algorithms, graphics, security, and databases.

The Computer Science Department offers Bachelors, M.S., and Ph.D. degrees. Detailed information can be obtained at: <http://www.cs.dartmouth.edu>

Persons interested should submit a curriculum vitae and a list of at least four references, at least one of whom can comment on teaching. Review of the applications will begin immediately and will continue until the search is complete. Please send application materials and general inquiries to:

Delia Mauceli  
Computer Science Recruiting  
Department of Computer Science  
Dartmouth College  
6211 Sudikoff Laboratory  
Hanover, NH 03755-3510

Specific questions can be referred to David Nicol, at the same address or at the following email address [nicol@cs.dartmouth.edu](mailto:nicol@cs.dartmouth.edu).

Dartmouth is an equal opportunity/Affirmative Action employer and encourages applications from women and members of minority groups.

### Dartmouth College

Institute for Security Technology Studies  
Research Associate

Applicants should possess a M.S. or PhD in computer science or a related field and have a strong background in networking and security. The researcher must have advanced programming experience in C++ and Java.

The Institute for Security Technology Studies is a principal national center for research, development, and assessment of technologies for combating electronic crime and terrorism.

Applicants can send a brief cover letter and CV via mail, fax or email attention:

SMITH COLLEGE

**Smith College**  
**Clare Boothe Luce Assistant/  
Associate Professor  
Of Computer Engineering**

Smith College invites applications and nominations for the Clare Boothe Luce Assistant/Associate Professor of Computer Engineering. This will be a tenure-track position jointly held in the Picker Engineering Program and the Department of Computer Science. Successful candidates will be instrumental in structuring and launching the new engineering curriculum and be able to teach in the general area of computer/electrical engineering. They will also be expected to sustain nationally respected research programs in areas such as: hardware design, computer architecture, system security, control systems, digital signal processing, systems engineering, networks, VLSI design, robotics, nanotechnology, and biochips. This position is funded, in major part, by the Clare Boothe Luce Foundation. As a result, applicants must be U.S. citizens, female, and hold a Ph.D. in an appropriate field. We are especially soliciting applications from scholars who will develop innovative approaches to engineering education that capitalize on an intimate liberal arts environment. Smith College, consistently ranked as one of the nation's top liberal arts colleges, is the first women's college to offer a major in engineering. A rigorous program of study will lead to a B.S. degree in Engineering Science. ABET accreditation will be sought. Send a curriculum vitae, list of five references and personal career statement that includes the candidate's philosophy regarding the teaching of engineering in a liberal arts environment to: Chair, Computer Engineering Search Committee, Picker Engineering Program, 51 College Lane, Smith College, Northampton, MA 01063

APPLICATIONS FROM MEMBERS OF UNDERREPRESENTED GROUPS ARE ESPECIALLY WELCOMED. REVIEW OF APPLICATIONS WILL BEGIN MID-OCTOBER AND CONTINUE UNTIL THE POSITION IS FILLED. THE POSITION WILL REMAIN OPEN UNTIL A SUITABLE CANDIDATE IS IDENTIFIED. SMITH COLLEGE IS AN EQUAL OPPORTUNITY EMPLOYER ENCOURAGING EXCELLENCE THROUGH DIVERSITY.

Garry Davis, Manager  
Cybersecurity Research Group  
Institute for Security Technology Studies  
Dartmouth College  
45 Lyme Road  
Hanover, NH 03755  
[gdavis@ists.dartmouth.edu](mailto:gdavis@ists.dartmouth.edu)  
fax: (603) 646-0660  
phone: (603) 646-0673

### DePaul University

School of Computer Science,  
Telecommunications and Information Systems

#### Tenure-track Full-time Faculty Positions

The School of Computer Science, Telecommunications and Information Systems (CTI) of DePaul University invites applications for multiple tenure-track positions beginning September 2002. We welcome applications from outstanding applicants in all areas of specialization. CTI is a young and growing school in downtown Chicago, with a wide range of degree programs. Undergraduate programs include Computer Science, Information Systems, E-Commerce Technology, Human-Computer Interaction, Network Technology, and Computer Graphics and Animation. Graduate programs at the Masters level include Computer Science, Telecommunications, E-Commerce Technology, Information Systems, Distributed Systems, Human-Computer Interaction, Software Engineering, and Management Information Systems. CTI also offers a Ph.D. program in Computer Science. CTI currently has over 80 full-time faculty and a student body growing at a rate of approximately 20% per year. By bridging faculty from several areas of computing and information technology and by placing them in the Loop — the heart of Chicago's business and financial district — DePaul has established a unique, dynamic, and entrepreneurial school. CTI rewards excellent teaching, provides strong support for research, and encourages creative applied scholarship. DePaul draws students of many backgrounds and cultures from a diverse urban setting. Thus, CTI is interested in recruiting and maintaining a diverse group of faculty. Members of all underrepresented groups, women, veterans, and persons with disabilities are invited and encouraged to apply. In Computer Science, faculty are actively pursuing research in a wide variety of areas, including artificial intelligence, computational complexity, computer vision, databases, distributed computing, foundations of programming languages, graphics, human computer interaction, information retrieval, intelligent agents, parallel and distributed algorithms, quantum computation, software engineering, and web data mining.

In Telecommunications, faculty are actively pursuing research in performance analysis of data networks, techniques for providing differentiated quality of service to Internet applications, formal methods in protocol development, efficient reliable multicasting for multimedia systems, distributed network management architectures, and effective wireless network coding techniques.

In Information Systems, faculty actively pursue research in electronic commerce, global information systems, system development methodologies, technology-supported learning, IT job skills, group support systems, collaborative systems design, data mining, business reengineering, IT outsourcing, and IT strategy and planning. Candidates should have a Ph.D. in a relevant field by the date of appointment. To apply, complete the online application form (at [www.cti.depaul.edu](http://www.cti.depaul.edu)) and send a curriculum vita, a teaching statement, a research statement and at least three letters of reference to:

Faculty Search Committee, School of Computer Science, Telecommunications and Information Systems  
DePaul University  
243 South Wabash Avenue  
Chicago, IL 60604-2301  
E-mail: [faculty\\_search@cti.depaul.edu](mailto:faculty_search@cti.depaul.edu)  
Electronic submission of documents is strongly encouraged. Applications will be accepted until positions are filled. DePaul University is committed to equality in educational and employment opportunities.

### Duke University

Department of Computer Science  
Experimental Systems Faculty Position

We invite applications and nominations for a tenure-track or tenured faculty position at any rank in the Department of Computer Science at Duke University, to start September 2002. Preference will be given to applicants in the various areas of experimental systems and architecture.

We continue to build upon an already strong, highly collaborative group in experimental systems. We are broadly interested in all areas of experimental systems including high-speed networking, Internet environments and services, mobile and wireless computing, databases and large-scale storage, computer architecture, parallel and distributed systems, compilers and programming languages, and operating systems.

This faculty hire will be in a position to help guide and influence the continued expansion of our vibrant and growing Department. For more information about the faculty, facilities and other resources, please refer to [www.cs.duke.edu](http://www.cs.duke.edu)

(cont'd)

## Professional Opportunities

Applications should be submitted in hard copy or via email with PDF attachments. Applications will include a curriculum vitae, a list of publications, and copies of the most important publications. A Ph.D. in computer science or related area is required. Applicants should arrange for at least four letters of reference to be sent directly to the Faculty Search Chair. To guarantee full consideration, applications and letters of reference should be received no later than January 15, 2002.

Send all information to:  
Faculty Search Chair  
Department of Computer Science  
Duke University  
Durham, NC 27708-0129  
facsearch@cs.duke.edu  
Duke University is an affirmative action, equal opportunity employer.

### Duke University

Department of Computer Science  
*Computational Science and Engineering Position*

The Department of Computer Science at Duke University invites applications and nominations for a position of Professor and Director of Duke's Center for Computational Science and Engineering (CSE) to start September 2002. Candidates should be recognized leaders in their field with a strong research record and general knowledge of CSE including numerical analysis and scientific computing. They should also have a record of collaboration and serious interest in applications of numerical computation, should be interested in enhancing as much as possible computational science as a broad-based campus activity and should be willing to work closely with faculty from a variety of departments to develop research and teaching programs in this area. Some preference may be given to candidates with an applied interest in computational biology and genomics.

The Department presently has two tenured faculty in numerical analysis and scientific computation with considerable additional strength in CSE throughout the Science (including Mathematics and Statistics) and Engineering Departments. Other research areas of the Department are artificial intelligence, systems, and theory, and this position is also expected to enhance and influence the continued expansion of our vibrant and growing Department. For more information about the faculty, facilities and other resources, please refer to [www.cs.duke.edu](http://www.cs.duke.edu).

Applications should be submitted in hard copy or via email with PDF attachments. Applications will include a curriculum vitae, a list of publications, and copies of the most important publications. A Ph.D. in computer science or related area is required. Applicants should arrange for at least four letters of reference to be sent directly to the Search Chair. To guarantee full consideration, applications and letters of reference should be received no later than January 15, 2002.

Send all information to:  
Donald J. Rose  
CSE Search Chair  
Department of Computer Science  
Duke University  
Durham, NC 27708-0129  
cssearch@cs.duke.edu  
Duke University is an affirmative action, equal opportunity employer.

### Emory University

Mathematics and Computer Science  
Department  
*Tenured and Tenure-Track Positions in Computer Science*

The Department of Mathematics and Computer Science, Emory University, invites applications for two anticipated tenure track Assistant Professorships or tenured appointments at the rank of Associate Professor or Professor, effective 2002-2003. Applicants must have a PhD in computer science or a

closely related field, with demonstrated promise in research and a strong commitment to teaching in a liberal arts environment. Senior candidates must have an established research program.

We seek candidates in both theory and systems. In systems, there is preference for database, high performance computing, networking, or distributed systems research. Exceptional candidates in other areas are also encouraged to apply. There are diverse opportunities for collaboration with CS faculty, applied and numerical mathematicians, and university faculty in biomedical and scientific computing. Emory University has embarked on an ambitious development program for the sciences and we expect substantial growth in departmental and interdepartmental education and research programs. We are committed to adding significant strength in computer science.

Applicants must provide CV's, with at least three recommenders' names, and have recommendation letters sent to:

Professor Dwight Duffus  
Screening Committee  
Department of Mathematics and  
Computer Science  
Emory University  
Atlanta, GA 30322

Screening of applications will begin on 15 December 2001, with initial interviews planned for mid-January and continuing until positions are filled.

Informal inquiries are welcome; please see our web page at <http://www.mathcs.emory.edu/News/Ops/> for further details.

Emory University is an Affirmative Action/Equal Opportunity Employer.

### Florida Institute of Technology

Department of Computer Sciences

The Department of Computer Sciences at Florida Tech is searching for assistant professors to join our faculty. Applicants in all fields of computer science and information systems will be considered. They must have a Ph.D. in Computer Science, Information Systems, or a closely related field. For full consideration applications should be received by 15 December 2001.

We seek individuals who can become committed to advancing Florida Tech in several ways: improving undergraduate education and strengthening our master's programs, enriching our Ph.D. program, and increasing research funding. The activities within the department and in the local area are conducive to research in software engineering, computer security, telecommunications, imaging, autonomous control, e-commerce, information assurance, and web technology, just to mention a few.

Florida Tech is located on the Space Coast. The campus occupies 130 tropical acres, including a picturesque, 30-acre botanical garden. The campus is 5 minutes from the Indian River estuary, 10 minutes from the Atlantic Ocean and 50 minutes from Kennedy Space Center.

Please send a cover letter, a curriculum vitae and contact information of at least three references to:

Faculty Search Committee  
Department of Computer Sciences  
Florida Institute of Technology  
150 W. University Blvd.,  
Melbourne, FL 32901-6975  
Florida Tech is an Equal Opportunity Employer.

### Georgia Institute of Technology

Computer Engineering Faculty

The School of Electrical and Computer Engineering at Georgia Tech seeks outstanding tenure-track candidates for research and teaching in all areas of Computer Engineering including embedded systems, digital systems, VLSI, CAD, computer architecture, novel computing paradigms, hardware/software co-design, systems software, formal verification, analog computation, computer networks,

adaptive computing, and testing. Georgia Tech has an outstanding undergraduate and graduate student body and significant institutional support for cross-disciplinary research. The Computer Engineering faculty benefits from strong research collaborations with traditional Electrical Engineering and Computer Science areas and actively participates in several federal and state sponsored research centers.

Please visit the ECE web site at <http://www.ece.gatech.edu>. Interested candidates should send CV, letter of interest, and list of references to:

Chair, School of ECE  
Georgia Institute of Technology  
Atlanta, GA 30332-0250

Georgia Tech is an equal opportunity, affirmative action employer.

### Georgia Tech

Tenure Track Faculty

Georgia Tech's College of Computing invites applications for tenure track faculty positions. Applications from outstanding candidates in all areas of computing and at all levels are welcome. We are especially interested in associate or full professor level candidates who have an outstanding record of research and teaching, particularly in biocomputing, graphics and animation, information security, and networking. With an academic faculty of 64, and a research faculty of 29, the College has a current enrollment of 1534 undergraduates, 125 Masters students, and 200 Ph.D. students. The College has a friendly and supportive environment, a superb support staff and a strong sense of community.

College strengths are in a broad range of research areas. A number of research centers, including the Graphics, Visualization and Usability Center, the Center for Experimental Research in Computer Systems, Georgia Tech Information Security Center, and Modeling and Simulation Research and Education Center, support a wide variety of collaborative as well as focused research projects. We are ranked among the top computer science and information technology programs nationally. One of the College's missions is to interact significantly with other academic units, so candidates with an inter-disciplinary research focus and/or interest in potential joint appointments are welcome. Georgia Tech's location in midtown Atlanta, home to numerous high-tech companies, offers many opportunities for working with leading edge companies and startups.

We encourage early applications but full consideration will be given to all applications that are received by January 1, 2002. Positions may be filled at any time, but we intend to make final decisions by May 1, 2002. Hardcopy applications, including a resume, names of at least three references, and any publications you'd like us to read, should be sent to:

Dr. Mustaque Ahamad, Co-Chair  
Faculty Search Committee  
College of Computing  
Georgia Institute of Technology  
Atlanta, GA 30332-0280  
Phone: (404) 894-8357  
Fax: (404) 894-9846

In addition, please email a URL pointing to your on-line resume and publications.  
Email: [recruiting@cc.gatech.edu](mailto:recruiting@cc.gatech.edu)

Georgia Tech is an Affirmative Action/Equal Opportunity Employer. Applications from women and under-represented minorities are strongly encouraged.

### Gordon College

Department of Mathematics and  
Computer Science

*Associate/Assistant Professor of  
Computer Science*

Gordon College invites applications for a tenure-track position in Computer Science beginning August 15, 2002. The department is seeking a person capable of excellent teaching with a commitment to scholarship involving undergraduates. Teaching responsibilities will be in introductory and upper-level courses in an object-oriented paradigm. Faculty teach three courses or equivalency per term. A Ph.D. in Computer Science is desired and previous teaching/professional experience and/or scholarship are preferred. Candidates must have a religious commitment compatible with Gordon's evangelical Christian mission. Review of applications will begin immediately and will continue until the position is filled. Send a letter of application, vita and a two-page statement of educational philosophy to:

Office of the Provost  
255 Grapevine Road  
Wenham, MA 01984

### Indiana University

Computer Science Department

*Faculty Positions*

The Indiana University Computer Science Department anticipates filling several tenure-track faculty positions beginning 2002-2003. Areas of interest are databases, embedded systems and networking. In addition our new, privately endowed, pervasive technology labs will be hiring several senior positions in the areas of graphics, human computer interaction, embedded systems and data mining. The CS department, which is part of the College of Arts and Sciences, is working cooperatively with our new School of Informatics, which

offers a B.S. degree focusing on the application of information technology to various disciplines and has M.S. programs in Human Computer Interaction, and Bio and Chemical Informatics. Cross-appointments with Informatics are possible in computer science related areas such as data mining and search technologies. A Ph.D. in Computer Science is required for all CS faculty positions.

Applicants must have demonstrated potential for excellence and productivity in research. In addition, a strong contribution to the educational mission of the department is expected. The department occupies a spacious limestone building with extensive state-of-the-art computing facilities. The attractive wooded campus of Indiana University is located in Bloomington, chosen as one of the most cultural and livable small cities in the US, and only one hour from the Indianapolis airport. To learn more about the department please visit our web site at [www.cs.indiana.edu](http://www.cs.indiana.edu). Please send a detailed CV and a list of references to:

Faculty Search, Computer Science  
Department  
Indiana University, Lindley Hall 215  
Bloomington, IN 47405-7104  
email: [search@cs.indiana.edu](mailto:search@cs.indiana.edu)  
Indiana University is an Equal

Opportunity/Affirmative Action Employer. The Computer Science Department strongly encourages applications from women and minorities.

### Iowa State University

Department of Electrical and Computer  
Engineering

Department of Electrical and Computer Engineering invites applications for several tenure track positions at all levels. We are seeking applicants in the areas of Computer Architecture, Networks, Parallel and Distributed Computing, Software Engineering, VLSI, Computer Graphics, Information Systems and Security, and Bioinformatics and Computational Biology. Candidates with interests in other areas of Computer Engineering will also be considered. Candidates with interdisciplinary research interests are encouraged to apply. Responsibilities include teaching at the undergraduate and graduate levels, pursuing leading edge research in computer engineering and publishing research results in leading journals and conferences, guiding graduate and undergraduate students, seeking, establishing, and maintaining external research funding, building a research group and participating in outreach activities.

By the date of employment, applicants should have a PhD in computer engineering, computer science, or a related discipline. Applicants must have a strong commitment to perform high quality basic or applied research and publish results, a strong commitment to teaching, and demonstrated potential for leadership in professional activities in areas of their specialty. Senior level candidates must have demonstrated ability to provide leadership and mentoring to build a strong research and teaching program in his/her area of expertise. Exceptional senior candidates will be considered for the Junkins and Palmer endowed chairs and for the Whitney and Sahai endowed professorships. Exceptional junior candidates will be considered for the Litton endowed professorship. Salary is commensurate with qualifications. The Department information can be found at <http://www.ee.iastate.edu>. Applicants should send a letter of application and a resume including names and addresses of at least 3 references to:

S. S. Venkata, Chair  
Electrical and Computer Engineering  
2215 Coover Hall, Iowa State University  
Ames, IA 50011

Application review will begin immediately and will continue until all positions are filled. To guarantee consideration, the application must be received by December 31, 2001. Iowa State University is an equal opportunity/affirmative action employer.

### Johns Hopkins University

Department of Computer Science

The Department of Computer Science at Johns Hopkins University is seeking applications for tenure-track faculty positions at all ranks and all fields. We have particular interest in candidates with research and teaching interests in systems, networks, security, algorithmic theory, machine learning, as well as robotics, computational biology and bioinformatics. All applicants must have a Ph. D. in computer science or a related field and are expected to show evidence of an ability and willingness to develop academic research and teach programs of the highest quality. Commitment to quality teaching at the undergraduate and graduate levels will be required of all candidates considered.

Johns Hopkins is a private University well-known for its commitment to academic excellence. Accordingly, Hopkins attracts extremely talented undergraduates and graduate students. The Department of Computer Science stands among the first rank of departments at the Hopkins in terms of funded research activities and student involvement in educational programs. The administration at

## WESTERN CONNECTICUT STATE UNIVERSITY Mathematics and Computer Science Fall 2002 Faculty

WCSU is seeking a candidate in Computer Science for a tenure track position (level is negotiable) to start the Fall semester, August 2002.

**Qualifications:** A Ph.D. in CS is preferred but candidates with a doctorate in a related field and either a master's degree in CS or evidence of successful teaching of CS courses for a period of five years may be considered. Preference will be given to candidates who can teach courses in networks and operating systems. All candidates must be able to teach courses in C++ and object-oriented programming. Preference will be given to candidates who can demonstrate strong teaching ability. Other duties include: maintaining and developing the CS curriculum, academic advisement, department and university committee work and continued research. Some night teaching is expected of all faculty in the department.

**Application Process:** Interested applicants should send a letter of interest, a resume, a curriculum vitae, copies of transcripts of all graduate work, a statement of teaching philosophy, and current letters of reference including telephone numbers to CS Search Committee, Dept. of Mathematics and Computer Science, 181 White Street, Danbury, CT 06810. Applications must be received by November 30, 2001.

*WCSU is an AA/EQ Educator/Employer.*

## Professional Opportunities

Johns Hopkins recognizes the major role computer science and information technology must play in the future of the University. The anticipated expansion in faculty and infrastructure in the Department of Computer Science is directed at further increasing national and international recognition of our research and teaching programs.

See the department webpage at <http://www.cs.jhu.edu> for additional information about the department, including links to research laboratories and centers. Applicants should submit all their application material (CV's, lists of references, statement of objectives, etc.) electronically. See <http://www.cs.jhu.edu/apply> for instructions and guidelines. Please send email to [apply@cs.jhu.edu](mailto:apply@cs.jhu.edu) for questions or clarifications or for any other technical issue. Those applicants who cannot follow the above guidelines (e.g. do not have access to electronic facilities) are encouraged to make alternative arrangements (e.g. submission via hard copy) by contacting:

Faculty Search Committee  
Department of Computer Science,  
Room 224  
New Engineering Building  
Johns Hopkins University  
Baltimore, MD 21218-2694  
Fax: 410-516-6134  
Phone: 410 516 8577  
email: [apply@cs.jhu.edu](mailto:apply@cs.jhu.edu)

We encourage applications to be submitted as soon as possible; however, to ensure full consideration, complete applications (including the reference letters) should be received by February 1, 2001.

The Johns Hopkins University is a EEO/AA employer. Women and minorities are strongly encouraged to apply.

### Johns Hopkins University

Department of Computer Science  
The Johns Hopkins University Department of Computer Science invites applications for a tenure-track faculty position in the general areas of computational biology and bioinformatics. Appointments at all academic levels will be considered. The successful candidate's primary appointment will be in the Department of Computer Science ([www.cs.jhu.edu](http://www.cs.jhu.edu)) of the Whiting School of Engineering, and he/she will be a member of the Whitaker Biomedical Engineering Institute ([www.wbmei.jhu.edu](http://www.wbmei.jhu.edu)). This newly formed Institute provides a highly interactive environment in which multidisciplinary teams of engineers, biologists, computer scientists, and mathematicians will address biomedical problems of fundamental importance. The Institute

builds on internationally recognized research programs based in the School of Medicine and the Whiting School of Engineering, including the Department of Biomedical Engineering. Current research activities in computational biology include an active collaboration with faculty at The Institute for Genomic Research ([www.tigr.org](http://www.tigr.org)) in nearby Rockville, MD. Successful applicants will be expected to establish independently funded research programs, and will participate in the graduate and undergraduate educational activities of both the Department of Computer Science and the Institute.

Applicants should submit all their application material (CV's, lists of references, statement of objectives, etc.) electronically. See <http://www.cs.jhu.edu/apply> for instructions and guidelines. Please send email to: [apply@cs.jhu.edu](mailto:apply@cs.jhu.edu) for questions or clarifications or for any other technical issue.

Those applicants who cannot follow the above guidelines (e.g. do not have access to electronic facilities) are encouraged to make alternative arrangements (e.g. submission via hard copy) by contacting:

Faculty Search Committee  
Department of Computer Science  
Room 224 New Engineering Building  
Johns Hopkins University  
Baltimore, MD 21218-2694  
Fax: (410) 516-6134  
Phone: 410 516 8577  
email: [apply@cs.jhu.edu](mailto:apply@cs.jhu.edu)

We encourage applications to be submitted as soon as possible; however, to ensure full consideration, complete applications (including the reference letters) should be received by February 1, 2001.

The Johns Hopkins University is a EEO/AA employer. Women and minorities are strongly encouraged to apply.

### Kansas State University

Department of Computing and Information Sciences

#### Faculty Position

The department of Computing and Information Sciences at Kansas State University invites applications for tenure-track position beginning in Spring and Fall 2002. Applicants should have a PhD degree in computer science by the starting date of the appointment; salary will be commensurate with qualifications. Applicants must be committed to both teaching and research. Primary consideration will be given to computer scientists who work in data/knowledge base systems, programming languages, distributed and parallel systems and software engineering.

Applications must include descriptions of teaching and research interests along with copies of representative publications. Non-U.S. citizens must include visa status.

The department has a faculty of seventeen and offers BS, MS, MSE, and PhD degrees. Computing facilities center around a network of UNIX and Solaris-based single- and multi-processor Sun workstations, X-terminals, PCs and a Beowulf system. Details can be found at the URL <http://www.cis.ksu.edu/>

Please send applications to:  
Dr. Virgil Wallentine, Head  
Department of Computing and Information Sciences  
234 Nichols Hall, Kansas State University  
Manhattan, KS 66506  
(email: [virg@cis.ksu.edu](mailto:virg@cis.ksu.edu))

Review of applications will commence October 15 and continue until the positions are filled.

Kansas State University is an Affirmative Action Equal Opportunity Employer.

### Massachusetts Institute of Technology

Department of Electrical Engineering & Computer Science

#### Faculty Positions

The Department of Electrical Engineering and Computer Science seeks candidates for faculty positions starting in September 2002. We anticipate openings for several faculty appointments for individuals who are completing, or who have recently completed, a doctorate. In special cases, a senior faculty appointment may be possible. Faculty duties include teaching at both the graduate and undergraduate levels, research, and supervision of theses.

We will consider candidates with backgrounds and interests in all areas of electrical engineering and computer science.

All candidates should write to the address below, describing their professional interests and their goals in both teaching and research. Each application should include a curriculum vitae and the names and addresses of three or more individuals who will provide letters of recommendation. Please arrange to have such letters sent directly to the address below. All candidates should indicate citizenship and, in the case of non-US citizens, describe their visa status. Please respond by January 15, 2002.

Send all applications to:

Prof. F. C. Hennie  
Massachusetts Institute of Technology  
77 Massachusetts Avenue, Room 38-435  
Cambridge, MA 02139

M.I.T. is an equal opportunity/affirmative action employer.

### Michigan State University

[www.cse.msu.edu](http://www.cse.msu.edu)  
Department of Computer Science & Engineering

#### Faculty Positions

The Department of Computer Science and Engineering (CSE) at Michigan State University invites applications for several 100% AY tenure-stream faculty positions to grow and strengthen the Department. Appointments may start in either January or August 2002. Candidates from all areas of specialization in computer science will be considered. The Department is particularly interested in candidates whose research areas complement or enhance its three existing strength areas: networking and mobile computing; robotics and machine intelligence; and software engineering and formal methods. The candidate should hold a Ph.D. degree in computer science or a related field. The appointment will be made at the rank appropriate to the credentials of the candidate.

As a unit within the College of Engineering, the Department offers BS, MS, and PhD degrees in Computer Science and jointly administers a BS program in Computer Engineering. The research activities in the Department are funded by a broad spectrum of government agencies and private corporations. Michigan State University nurtures interdisciplinary work across departments, with industry, and with other universities. The CSE Department presently has 25 faculty members and awards roughly 100 BS, 40 MS, and 10 PhD degrees per year. Candidates should visit the Department web pages at the URL given above for detailed information on our research and instructional programs.

Michigan State University enjoys a park-like campus of over 2000 developed acres and over 3,000 acres of outlying research facilities and natural areas. The campus is adjacent to the city of East Lansing and the capital city of Lansing. The Greater Lansing area has approximately 250,000 residents. The local communities have excellent school systems and place a high value on education. Michigan State University is pro-active in exploring opportunities for the employment of spouses, both inside and outside the University.

Applications will be reviewed and interviews will be arranged on a continuing basis until all positions are filled. Applications for Spring 2002 interviews should be received before January 15, 2002 for full consideration. Please submit a cover letter, curriculum vitae, the names of three references, and a statement of research and teaching interests to:

Faculty Search Committee  
Department of Computer Science & Engineering  
3115 Engineering Building  
Michigan State University  
East Lansing, Michigan 48824-1226  
[search@cse.msu.edu](mailto:search@cse.msu.edu)

Michigan State University is an Equal Opportunity/Affirmative Action Institution and encourages applications from women and members of ethnic minority groups. Persons with disabilities have the right to request and receive reasonable accommodation.

### Michigan State University

Department of Telecommunication

The Department of Telecommunication at Michigan State University invites applications for a tenure stream, Assistant Professor in information technology. We seek a talented teacher/scholar with a background in the area of information technology and services. Applicants must possess a Ph.D. in a related discipline. Applicants should submit a letter of interest, a curriculum vitae, and the names, addresses and telephone numbers of three references. The deadline for submission is January 5, 2002 or until the position is filled. Send applications to:

Pamela Whitten  
Michigan State University  
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### National Science Foundation, Arlington, VA

Division of Advanced Computational Infrastructure and Research

#### Director

NSF's Directorate for Computer and Information Science and Engineering seeks candidates for Director, Division of Advanced Computational Infrastructure and Research (ACIR). The Division supports research and education in computational research and closely related areas. Information about the Division's activities may be found at <http://www.nsf.gov/home/cise/>.

Appointment to this Senior Executive Service position may be on a career basis or a 2 to 3 year limited term basis, with a salary range of \$120,261 to \$133,700. Alternatively, the incumbent may be assigned under Intergovernmental Personnel Act provisions. Applicants must have a Ph.D. or equivalent professional experience in computer science or related field, substantial research administration experience, and demonstrated leadership skills.

Announcement S20020002, with position requirements and application procedures, is located on the NSF Home Page at <http://www.nsf.gov/home/chart/work.htm#hrm>.

Applicants may also obtain the announcements by contacting the Executive Personnel Staff, 703-292-8755 (Hearing impaired individuals may call TDD 703-292-8044). Applications must be received by November 30, 2001.

NSF is an equal opportunity employer committed to employing a highly qualified staff reflecting the diversity of our nation.

### NEC Research Institute Computer Science Division

Researcher (job title: Scientist).  
Research Programmer (job title: Research Associate or Senior Research Associate).

NEC Research Institute, Princeton, NJ, seeks to fill one of the following positions.

Researcher. Do applied research in face recognition. Educational level: PhD or equivalent experience.

Research Programmer. Support applied research in face recognition. Educational level: MS or equivalent experience.

We are working on a project to go well beyond the current state of the art in face recognition. You should have appropriate background in computer vision, face recognition, learning algorithms. Experience with or willingness to work with vision hardware would be useful. Programming is to be done primarily in a limited subset of C++; C experience is sufficient (C++ experience is more important for the Research Programmer position). We use mainly Linux and gcc, but also Windows NT/2000 and MS Visual C++, and SGI's and Irix, and Matlab on various platforms. Salaries are competitive and commensurate with experience, and a generous bonus plan applies.

NEC Research Institute performs pure and applied research in computer science and physical sciences, and is located in the Princeton, NJ area.

NEC Research Institute is an Equal Opportunity Employer.

For more information, please contact:

A. Peter Blicher  
NEC Research Institute  
4 Independence Way  
Princeton, NJ 08540  
[blicher@research.nj.nec.com](mailto:blicher@research.nj.nec.com)

Resumes and vitae should also be sent to these addresses. Any form is acceptable; electronic is better; ascii is best; use obscure formats at your own risk, but we can probably

(cont'd)

## Department of Computer Science

### Tenure Track Positions, All Levels - Ref: AP#1

Applications are invited for tenure-track positions. These positions are at the assistant, associate, or full professor level depending on experience. Applicants should have a Ph.D. in computer science or in a closely related field. The department requires demonstrated research accomplishment at the highest level as well as outstanding teaching ability and leadership qualities. Candidates should be enthusiastic about the central role that computer science can play on the campus of a large research university. We are an expanding department with seven new faculty hires during the past two years and are part of a new administrative structure on campus that promotes interdisciplinary research and teaching in the computing and information sciences.

The Department of Computer Science at Cornell University encompasses a wide range of research areas, including artificial intelligence, concurrency and distributed computing, databases, algorithms, information organization and retrieval, multimedia systems, applied logic and semantics, numerical analysis and scientific computing, theory of computation, programming languages and methodology, computer vision, computational biology, graphics, theory, networks, operating systems, and natural language processing. Although we are especially interested in networks, databases, digital libraries, graphics, systems, theory, and computational biology and bioinformatics, applicants in all areas of computer science will be thoroughly considered.

The Department is administered by the Office of Computing and Information Science (CIS), a larger unit that can co-sponsor faculty positions in the Faculty of Computing and Information with any department on campus. Applications that are not appropriate for the Department of Computer Science will automatically be evaluated in this larger context by the CIS. In particular, there is a campus-wide initiative in information science that involves the Department of Communication, the Department of Economics, the Department of Science & Technology Studies, and the School of Operations Research & Industrial Engineering. CIS and the College of Architecture, Art, and Planning are also interested in the Digital Arts and Graphics.

### Also available: Research Ref: RES#3

Research associate positions in scientific computing and software systems.

Further information about the department is available on the World Wide Web at URL: <http://www.cs.cornell.edu/>

Applicants should submit a vita and the names of at least three references to:

Chair, Faculty Recruiting Committee  
Department of Computer Science  
4130 Upson Hall  
Cornell University  
Ithaca, NY 14853-7501

Please include reference number with application.

Cornell University is an equal opportunity employer and educator and welcomes applications from women and ethnic minorities.

<http://www.cornell.edu>  
<http://chronicle.com/jobs/profiles/2377.htm>

## Professional Opportunities

read them. Please provide as much information as possible.

The NEC Research Institute web site is <http://www.neci.nj.nec.com>

### New York University

Department of Computer Science

The department expects to have several regular faculty positions beginning in September 2002 and invites candidates at all levels. We are particularly interested in the following areas: interfaces (graphics, vision, speech), e-commerce, data mining, mobile and autonomous computing, distributed and secure systems, real-time systems, verification, and bioinformatics. We will also consider outstanding candidates in other areas. Faculty members are expected to develop an independent first-rate research program and to participate in teaching at all levels from the undergraduate to the doctoral. The new appointees will be offered highly competitive salaries, competitive startup packages, and low-cost university housing within short walking distance of the department. New York University is located in Greenwich Village, one of the most attractive residential areas of Manhattan.

The department may also have one or more visiting positions, with appointments for either one or two semesters.

The department has 27 regular faculty members and several adjunct, clinical, research, and visiting faculty members. Current strengths of the department lie in algorithms, compilers and programming languages, computational biology, computer graphics, computer vision and image processing, cryptography and security, distributed and parallel computing, multimedia, natural language processing, scientific computing, and verification. There are specialized laboratories and research facilities for computer graphics and multimedia, computer vision, and parallel and distributed computing.

Collaborative research with industry is facilitated by the geographic proximity to the main research centers of AT&T, BellCore, IBM, Lucent, Matsushita, NEC, and Siemens.

Applications should include a resume, a statement of career objectives, key publications, and names of references, at least three for junior positions and at least five for senior positions. Applicants are encouraged to provide a URL for a description of their activities. To guarantee full consideration, applications should be received no later than Jan. 7, 2002; however, this is not a hard deadline, as all candidates will be considered to the extent feasible, until all positions are filled.

Please send applications to:

C/o Shanta Stroud  
Faculty Search  
Department of Computer Science  
New York University  
251 Mercer Street  
New York, NY 10012-1185

New York University is an equal opportunity/affirmative action employer.

### North Carolina State University

College of Management, Department of Business Management

*Faculty Positions - Information Technology, Information Systems*

NC State University invites applications for positions in The Department of Business Management beginning in August 2002. One position will be at the Assistant level, and one position will be at the Associate/Full Professor level. The Department of Business Management is an interdisciplinary department housing functions such as supply chain management, marketing, management, finance, and information technology. The College of Management's mission emphasizes the management of technology, and special emphasis has been given to programs in IT and e-commerce. Qualifications include a Ph.D. or DBA in information systems/information technology and a strong commitment to quality teaching, research, and service.

Applications will be accepted beginning July 1, 2001 and will continue until the positions are filled. Interested candidates should send a copy of their curriculum vitae and three letters of recommendation to:

Greg Young, Chair  
IT Search Committee  
Department of Business Management  
Box 7229, North Carolina State University  
Raleigh, NC 27695-7229

North Carolina State University is dedicated to equality of opportunity within its community. Accordingly, North Carolina State does not practice or condone discrimination in any form against students, employees or applicants on the basis of race, color, national origin, religion, gender, age or disability. Individuals with disabilities desiring accommodations in the application process should contact:

Yolanda M. Sanders  
College of Management  
North Carolina State University  
Raleigh, NC 27695-7229  
[yolanda\\_sanders@ncsu.edu](mailto:yolanda_sanders@ncsu.edu)  
(919) 515-6939

### North Carolina State University

Department of Computer Science  
Operating Systems

*Tenure-Track Assistant Professors*

The North Carolina State University Department of Computer Science seeks one or more tenure-track assistant professors in the area of operating systems to begin August 16, 2002. We are seeking candidates who have worked on operating systems support for distributed computing, real-time embedded computing, parallel computing, networked multimedia computing, or mobile wireless computing. Candidates are expected to have both strong experimental and theoretical interests in the areas of operating systems research and education. Successful candidates will have a PhD in Computer Science or a related field, and demonstrated potential to establish a strong research and teaching program in NCSU.

These positions have been created to complement our established research strength in computer networking and distributed systems. A number of faculty have an interest in multimedia networking, optical networks, network security, real-time communication, quality-of-service, concurrent system testing, distributed database systems, and object-oriented programming. Their work is supported by NSF, DARPA, AFOSR, Cisco, Ericsson, Fujitsu, IBM, MCNC, Nortel, NSA, and the State of North Carolina. The Department is in a period of rapid growth and advancement, and is positioning itself to be at the forefront of selected areas in computer science. The candidate will have access to our state-of-art high performance ATM-based network, and the North Carolina Giga-POP and Internet-2 facilities.

The University is located in Raleigh which forms one vertex of the world-renowned Research Triangle Park. The Research Triangle area was recently recognized as one of the best places to live in the U.S. It also boasts a high concentration of high technology companies. In addition to the historical campus, the department occupies substantial space on NCSU's new Centennial Campus, an innovative collocation of university and industrial labs designed to foster close collaboration. The State of North Carolina recently passed a major bond initiative that includes \$83 million for a new engineering campus on Centennial Campus. A new 90,000 sq. ft. \$36 million Computer Science/Computer Engineering building is currently in the design stage. Interested candidates should send their curriculum vitae and the names of four references to:

Operating Systems Recruitment  
Committee  
Department of Computer Science  
North Carolina State University  
Raleigh, NC 27695-8206

Prospective candidates are encouraged to access the Department's homepage (<http://www.csc.ncsu.edu/>) and to write to [os\\_search@csc.ncsu.edu](mailto:os_search@csc.ncsu.edu) if necessary. NC State is an Equal Opportunity, Affirmative Action employer. Individuals with disabilities desiring accommodations in the application process should contact the Computer Science Department at NCSU at (919) 515-2858.

### North Carolina State University

Department of Computer Science  
*Computer Networking*

The Department of Computer Science at North Carolina State University seeks an assistant professor in the general area of computer networking. Candidates are expected to have both strong theoretical and applied interests in the area of networking research and education. The successful candidate will have a PhD in Computer Science or a related field and an extensive research record.

This new position has been created to further strengthen our activities in advanced networking research, as well as the interactions of the Department with the high technology industry. Networking is one of the key areas in the department, and several current faculty have research programs in networking technologies and applications. Their work is supported among others by AFOSR, DARPA, NSA, NSF, MCNC, Cisco, Ericsson, Fujitsu, IBM, Nortel, Lucent, Alcatel, and the State of North Carolina. The successful candidate is also expected to play an important educational role within the Master of Science in Computer Networking, offered jointly by the Departments of Computer Science and Electrical Engineering, and the College of Management. This unique educational degree reflects both the strength of our networking program and the increasing importance of the rapidly growing computer networking industry in the State of North Carolina.

The Department is in a period of rapid growth and advancement, and is positioning itself to be at the forefront of selected areas in computer science. In addition to funding from the above organizations, we attract support from many other organizations. The candidate will have access to the department's and University's state-of-the-art network infrastructure consisting of millions of dollars in production equipment and research prototypes, including a brand-new \$6M five-node, 16-wavelength WaveStarTM AllMetro 40G optical network built with equipment donated

by Lucent that will be used for research purposes. The North Carolina Giga-POP and Internet-2 facilities are also available, as our faculty play a prominent role within these initiatives through collaborations with other Universities and local industry.

The University is located in Raleigh, which forms one vertex of the world-renowned Research Triangle Park. The Research Triangle area was recently recognized as one of the "best places to live" in the U.S. and boasts a high concentration of high technology companies. The core of our networking activities takes place at NCSU's Centennial Campus, an advanced technology community for university, corporate and government R&D facilities and business incubators, which is quickly emerging as the Research Triangle area's fastest growing development. We recently obtained space in the new \$41 million Engineering Graduate Research Center on NCSU's industry-oriented Centennial Campus, which has become the focal point for networking-related research. The State of North Carolina recently passed a major bond initiative that includes funds for the construction, within 2-3 years, of a new building on Centennial Campus to house the Department of Computer Science.

Interested candidates should send a cover letter, their curriculum vitae (including citizenship and visa status), sample of two papers and the names of four references to:

Chair, Network Recruitment Committee  
Department of Computer Science  
North Carolina State University  
Raleigh, NC 27695-8206

Prospective candidates are encouraged to access the Department's homepage (<http://www.csc.ncsu.edu/>) and to send mail to [net\\_search@csc.ncsu.edu](mailto:net_search@csc.ncsu.edu). NC State is an Equal Opportunity, Affirmative Action employer. Individuals with disabilities desiring accommodations in the application process should contact the Computer Science Department at NCSU at (919) 515-2858.

### North Carolina State University

Department of Computer Science  
*Database Systems and Data Mining*

The North Carolina State University Department of Computer Science seeks one or more tenure-track assistant professors in the area of database systems and/or data mining to begin August 16, 2002. Successful candidates will have a PhD in Computer Science or a closely related field, and demonstrated potential to establish a strong research and teaching program at NCSU. Candidates are expected to have both strong experimental and theoretical interests in the areas of database systems research and education. We are seeking candidates who have carried out research in database design and organization, database security, networked databases, information access and retrieval, data mining and warehousing, distributed databases, object-oriented databases, or other related topics.

The new faculty members will find a lively and collegial work environment with many opportunities for collaboration on campus and with local industry. The department is in a period of rapid growth and advancement, and is aggressively positioning itself to be at the forefront of selected areas in computer science. These new positions have been created to further strengthen our ongoing activities in such areas as decision support, online data monitoring, electronic commerce, virtual enterprises, heterogeneous and object-oriented databases, machine learning, intelligent data analysis, multiagent systems, intelligent multimedia, distributed computing, scientific visualization, networking, and human interfaces.

We attract research sponsorship from a variety of sources, including NSF, DARPA, AFOSR, ONR, NIH, USEPA, NSA, and the State of North Carolina. Industrial sources include IBM, SAS, GlaxoSmithKline, Procter & Gamble, Fujitsu, and Cisco. The candidate will have access to our state-of-art high performance ATM-based network, and the North Carolina Giga-POP and Internet-2 facilities.

NCSU, a Doctoral/Research land-grant university, is located in Raleigh, a vertex of the world-renowned Research Triangle, which boasts a high concentration of high technology companies and research institutions. The state of North Carolina is a world center of banking and finance. The Research Triangle area was recently recognized as one of the best places to live in the U.S. In addition to the historical campus, the department occupies substantial space on NCSU's new Centennial Campus, an innovative collocation of university and industrial labs designed to foster close collaboration. The State of North Carolina recently passed a major bond initiative that includes \$83 million for a new engineering campus on Centennial Campus. A new 90,000 sq. ft. \$36 million Computer Science/Computer Engineering building is currently in the design stage.

Interested candidates should send a cover letter, curriculum vitae, sample of two papers and the names of four references to:

Database Systems Recruitment Committee  
Department of Computer Science  
North Carolina State University  
Raleigh, NC 27695-8206

Prospective candidates are encouraged to access the Department's homepage (<http://www.csc.ncsu.edu/>) and to write to

[db\\_search@csc.ncsu.edu](mailto:db_search@csc.ncsu.edu) if they wish. NC State is an Equal Opportunity, Affirmative Action employer. Individuals with disabilities desiring accommodations in the application process should contact the Computer Science Department at NCSU at (919) 515-2858.

### OGI School of Science and Engineering

Department of Computer Science and Engineering

The Department of Computer Science and Engineering invites applications for faculty positions at all ranks. Our target areas include bioinformatics and computational biology, security, mobile and embedded systems, real-time and reactive systems, computational science, modeling and simulation, databases and data mining, computer architecture, vision, robotics, visualization and sensor fusion. In addition, we are interested in excellent candidates that enhance our existing capabilities in networking, distributed systems, machine learning, human-computer interaction, spoken language systems, software engineering, applied formal methods and verification of both hardware and software.

Building on a shared commitment to excellence in graduate education and research, Oregon Graduate Institute of Science and Technology (OGI) merged with Oregon Health Sciences University (OHSU) on July 1, 2001. OGI now is the OGI School of Science and Engineering in the re-named Oregon Health & Science University (OHSU). The merger will enable the CSE department to expand in core disciplines and establish strong interdisciplinary collaborations among researchers in information technology, health care and biosciences. Significant collaborations between OGI and OHSU have existed for 30 years.

The typical teaching load in CSE is 2 graduate-level classes per year. Faculty receive contracts of 2-5 years duration, renewable annually with satisfactory academic performance. NSF, NIH and other federal research sponsors recognize OGI faculty appointments as being equivalent to tenured positions.

OGI is located 12 miles west of Portland, Oregon, in the heart of the Silicon Forest. Portland's thriving high-tech community, extensive cultural amenities and spectacular natural surroundings combine to make the quality of life here extraordinary. To learn more about the department, OGI, OHSU and Portland, please visit <http://www.cse.ogi.edu>.

To apply, send a brief description of your research interests, the names of at least three references and a curriculum vitae with a list of publications to:

Chair, Recruiting Committee  
Department of Computer Science and Engineering  
OGI School of Science and Engineering at OHSU  
20000 NW Walker Road  
Beaverton, Oregon 97006  
The email address for inquiries is: [csedept@cse.ogi.edu](mailto:csedept@cse.ogi.edu).

OGI/OHSU is an Equal Opportunity/Affirmative Action employer. We particularly welcome applications from women, minorities, and individuals with disabilities.

### The Ohio State University

Department of Computer and Information Science

The Department of Computer and Information Science invites applications for at least six tenured or tenure-track positions. Areas of primary interest include, but are not limited to, artificial intelligence (including speech and language processing, vision, and machine learning), graphics (including visualization, computer animation, geometric modeling and meshing), human-computer interaction, networking (including mobile computing and network security/dependability), software engineering (including component-based software, formal methods, and programming languages), and systems (including operating systems, data-intensive computing, grid computing, network-based computing, parallel systems, distributed computing, and scientific computing).

Appointments at all ranks will be considered. Applicants for an assistant professor position should hold or be completing a Ph.D. in computer science or a closely related field, and have a commitment to excellent research and quality teaching. Applicants for a senior position should also demonstrate a strong record of external funding and impact on their field.

The department maintains active collaborative relationships with the Ohio Supercomputer Center, Advanced Computing Center for the Arts and Design, Cognitive Science Center, and many other centers and departments in the university.

To apply, please send a curriculum vitae, along with a cover letter, by e-mail to [fsearch@cis.ohio-state.edu](mailto:fsearch@cis.ohio-state.edu) or by mail to:

Chair, Faculty Search Committee  
Department of Computer and Information Science  
The Ohio State University  
2015 Neil Avenue, DL395  
Columbus, OH 43210-1277

Review of applications will begin immediately and will continue until the positions are

## Professional Opportunities

filled. For additional information please see <http://www.cis.ohio-state.edu>.

The Ohio State University is an Equal Opportunity/Affirmative Action Employer. Qualified women, minorities, and individuals with disabilities are encouraged to apply.

### Panasonic

Panasonic is respected around the world for innovative electronic and computer products. Innovation begins with the vision and creative thinking of professionals in R&D facilities like our Princeton, NJ based Panasonic Information and Networking Technologies Laboratory. Our center is involved in creating secure, internet-enabled platforms for the ubiquitously networked world. Right now we have the following opportunity available:

Operating Systems Scientist Job Code: 2455  
Work towards creating the operating systems of the future. The ideal candidate must have experience in real-time operating systems architectures for multimedia applications. Hands-on experience in secure operating systems and/or microkernels is a plus. IP Networking/Telephony Scientist Job Code: 5368

Conduct research and development on the evolution of communication systems, particularly mobile communications systems, towards all IP networks. It is expected that research results will lead to patents as well as conference and journal publications. Researchers are expected to develop prototypes that demonstrate the practical feasibility of their ideas. Desirable characteristics include knowledge of VoIP, SIP, & SIP extensions.

All positions require candidates to have a Ph.D. in Computer Science or a closely related field, or equivalent experience.

In addition to an environment that's as innovative as our products, we offer competitive salaries and superior benefits. Please forward your resume, with job code and salary requirement, to:

Panasonic Technologies Inc.  
2 Research Way  
Princeton, NJ 08540

E-mail: [recruit@research.panasonic.com](mailto:recruit@research.panasonic.com)

We are committed to creating a diverse work environment and proud to be an equal opportunity employer (m/f/d/v). Pre-employment drug testing is required. Due to the high volume of response, we will only be able to respond to candidates of interest. All candidates must have valid authorization to work in the U.S. PINTL is an R&D laboratory of Panasonic Technologies, Inc. ([www.pintl.research.panasonic.com](http://www.pintl.research.panasonic.com))

### Pomona College

Department of Computer Science

Tenure-track assistant professorship, beginning July, 2002. Candidates at more senior levels will be considered. Requirements: Ph.D. in computer science, broad background in computer science, excellence in teaching a wide range of courses. Should be able to teach an ethnically diverse student body, have a strong independent research agenda, and be excited about directing student research.

Application includes: cv; 3 or more letters of recommendation, at least one of which evaluates teaching; a statement of teaching philosophy; and a description, written for the non-specialist, of research accomplishments and plans. Applications completed by January 7, 2002, will receive full consideration.

Pomona College is an equal opportunity employer and especially invites applications from women and members of under-represented groups.

Further information from  
<http://www.cs.pomona.edu>  
[cs\\_search@pomona.edu](mailto:cs_search@pomona.edu).

### Purdue University

Department of Computer Sciences  
*Tenure-Track Positions*

The Department of Computer Sciences at Purdue University invites applications for tenure-track positions beginning August 2002. Positions are available at the assistant professor level; senior positions will be considered for highly qualified applicants. Applications from outstanding candidates in all areas of computer science will be considered. Areas of particular interest include security, networking and distributed systems, scientific computing, and software engineering.

The Department of Computer Sciences offers a stimulating and nurturing academic environment. Thirty-five faculty members have research programs in analysis of algorithms, bioinformatics, compilers, databases, distributed and parallel computing, geometric modeling and scientific visualization, graphics, information security, networking and operating systems, programming languages, scientific computing, and software engineering. The department implements a strategic plan for future growth which is strongly supported by the higher administration. This plan includes a new building expected to be operational in 2004 to accommodate the significant growth in faculty size. Further information about the department is available at <http://www.cs.purdue.edu>.

Applicants should hold a Ph.D. in Computer Science, or a closely related discipline, and should be committed to excellence in teaching and have demonstrated strong potential for excellence in research. Salary and

benefits are highly competitive. Special departmental and university initiatives are available for junior faculty. Candidates should send a curriculum vitae, a statement of career objectives, and names and contact information of at least three references to:

Chair, Faculty Search Committee  
Department of Computer Sciences  
Purdue University  
West Lafayette, IN 47907-1398

Applications are being accepted now and will be considered until the positions are filled. Inquiries may be sent to [fac-search@cs.purdue.edu](mailto:fac-search@cs.purdue.edu).

Purdue University is an Equal Opportunity/Affirmative Action employer. Women and minorities are especially encouraged to apply.

### Rochester Institute of Technology

Computer Science Department

The Computer Science Department invites applications for full-time tenure track positions. The department, part of the newly formed Golisano College of Computing and Information Sciences, offers an MS and CSAB-accredited BS degree in Computer Science. An important goal of the Institute and the College is to achieve diversity in the student body, faculty, staff, and administration. Applications from minorities, women, and other under-represented groups are especially encouraged. Applicants should be prepared to participate in a department that emphasizes a strong commitment to teaching as well as to consistent professional development. While a Ph. D. in Computer Science or a related field is preferred, applicants having a Masters degree in C. S., relevant industrial experience will be considered. Teaching experience is highly desirable. Please submit a letter of interest, a statement of teaching philosophy, a current resume and the names of three references to:

Search Committee c/o Sandy Ferrara  
Dept. of Computer Science  
RIT, 102 Memorial Drive  
Rochester, NY 14623-5608  
email: [hiring@cs.rit.edu](mailto:hiring@cs.rit.edu)

See a more complete description at  
<http://www.cs.rit.edu/~csdept/search>

### Rochester Institute of Technology

College of Computing and Information Sciences

*Dean of the B. Thomas Golisano College of Computing and Information Sciences*  
Rochester Institute of Technology is searching for an exceptional individual to become the first Dean of the B. Thomas Golisano College of Computing and Information Sciences (GCCIS).

RIT is a privately endowed, coeducational, non-sectarian, technological university located on a 1300-acre campus in suburban Rochester, New York. The Institute has over 14,300 students enrolled in more than 200 programs housed in its eight colleges. GCCIS has approximately 70 full-time faculty, 2000 undergraduate students, and more than 650 full-time and part-time graduate students in three departments: Computer Science, Information Technology, and Software Engineering. Cooperative education is a mandatory component of all GCCIS undergraduate programs; the Computer Science program is ABET accredited and the Software Engineering program will seek accreditation this year. The newest college of RIT, GCCIS's three academic departments will be housed in a new \$17 million building, with a second \$1.5 million building for its applied research arm, the IT Lab.

The Dean is the chief academic, fiscal, and administrative officer, and has a key role in securing funds for the college's initiatives. The Dean reports to the Provost and Vice-President for Academic Affairs, manages an operating budget of over \$12.5 million, and is the primary representative of the college within RIT and to alumni, industry, government, foundations, and the public at large. We are seeking an outstanding individual who will work with all the college's constituencies to craft and articulate a strategic vision that builds on the complementary but distinctive characteristics of the three academic departments and the IT Lab. The successful candidate must value and maintain RIT's emphasis on undergraduate education, while leading GCCIS in key initiatives such as undergraduate retention, enhanced professional graduate programs, applied research, and a possible interdisciplinary doctoral program. The Dean must work effectively with all units at RIT, emphasizing multidisciplinary cooperation among the college's departments and other academic programs and research centers at RIT.

Applications and nominations will be accepted from qualified individuals who have a Ph.D. in a related discipline, have demonstrated excellence in teaching, academic administration, and interaction with government and industry, and have a record of securing funding to support academic programs. Industrial experience is highly desirable. An important goal of the Institute and the College is to achieve diversity in the student body, faculty, staff, and administration.

Applications from minorities, women, and other under-represented groups are especially encouraged. Please respond to:

The Search Committee for the Dean of the Golisano College of Computing and Information Sciences  
Office of the Provost  
Rochester Institute of Technology  
12 Lomb Memorial Drive  
Rochester NY 14623-5604

The target date for the new Dean to assume office is July 1, 2002.

### Southern Illinois University, Carbondale

Faculty Position in Computer Science

Applications are invited for up to two tenure track faculty positions at the Assistant Professor or Associate Professor level, starting August 16, 2002. Basic requirements include a Ph.D. in computer science or related field by date of hire, evidence of ongoing and future research, and teaching competency in a reasonable number of computer science subjects. Applicants with a research specialty in any area of computer science will be considered. Associate Professor applicants should have substantial teaching and research experience at the Assistant Professor and/or Associate Professor level, and should have a solid record of publication and external funding. Review of completed applications will begin on January 2, 2002, and continue until the position is filled. Applicants should send a letter of interest, curriculum vita, and three current letters of recommendation to:

Faculty Search Committee  
Department of Computer Science  
Mailcode 4511, Fanner 2125  
Southern Illinois University  
Carbondale IL 62901-4511

For more information about the Department of Computer Science, see our web site at <http://www.cs.siu.edu>. Questions may be directed to the Chair of the Faculty Search Committee, via [georgia@cs.siu.edu](mailto:georgia@cs.siu.edu). SIUC is an AA/EOE. Women and minorities are encouraged to apply.

### Stanford University

Departments of Radiology and Computer Science

*Faculty Opening*

Stanford University's Departments of Radiology and Computer Science invite applications for a tenure-track faculty position at the Assistant Professor level from candidates with expertise in the areas of medical image understanding (including image segmentation and interpretation), image-guided surgery, and/or human-computer interactions. We are especially interested in applicants who would apply their expertise in these areas to the computer-aided detection of disease from radiological images and the planning of surgical procedures. Higher priority will be given to the overall innovation and promise of the candidate's work than to any specific area. An earned Ph.D. in Computer Science or a related field, evidence of the ability to pursue a research program and a commitment to teaching are required. The successful candidate will be expected to teach courses in both departments, secure independent research funding, and build and lead a team of graduate students in Ph.D. research.

The appointment will be made at the level of an Assistant Professor. The position is available beginning Spring 2002. Further information about the Radiology and Computer Science Departments can be found at <http://www-radiology.stanford.edu> and <http://www-cs.stanford.edu>, respectively.

Applications should include a curriculum vita, statements of research and teaching interests and the names of at least four references. The application should be sent to:

Professor Oussama Khatib  
Search Committee Co-Chair  
c/o Laura Kenny-Carlson  
Computer Science Department  
Stanford University, Gates 2B  
Stanford, CA 94305-9025

The review of applications will begin on October 15, 2001, but applications will be accepted until the position is filled. Stanford university is an equal opportunity employer and welcomes nominations of women and minority group members as well as applications from them.

### University at Buffalo, The State University of New York

Faculty Positions in Computer Science and Engineering

The Department of Computer Science and Engineering (CSE) has faculty openings at all levels. Candidates in all areas of CSE will be considered, but we especially solicit applicants in the systems and applied areas, including high-performance computing, multimedia, databases, networks, and VLSI.

CSE faculty are affiliated with the Center for Computational Research, a leading academic supercomputing center in the U. S., the Center of Excellence in Document Analysis and Recognition, the National Center for Geographic Information and Analysis, and Center for Cognitive Science. The faculty include AAAI, ACM, and IEEE Fellows as well as NSF Career and ITR awardees. The average annual research expenditure over the

past three years has been approximately \$4.5 million.

Junior candidates are expected to have a Ph.D. in Computer Science/Engineering or related field by September 2002, and must demonstrate evidence of potential for publishing and developing a successful funded research program. Senior candidates are expected to have an excellent record of publication and funded research as well as international stature and recognition commensurate with rank.

All applications should include a cover letter, curriculum vitae, and the names of least three references (applicants for senior positions should have five references). In addition, all applicants should have letters of reference sent by the due date. Address applications to:

Chair, Faculty Search Committee  
Department of Computer Science and Engineering  
201 Bell Hall, University at Buffalo  
Buffalo, NY 14260-2000

Email: [cse-search@cse.buffalo.edu](mailto:cse-search@cse.buffalo.edu)

Due date for applications and letters of reference: January 4, 2002.

The University at Buffalo is New York's largest and most comprehensive public university. As the second largest city in New York State, Buffalo is the hub of a metropolitan area with a population over 1.1 million. University life is enriched by scenic, recreational, and cultural opportunities in the city, suburbs, and the neighboring Niagara and Metro Toronto regions. For more information, please visit our website, <http://www.cse.buffalo.edu>.

The University at Buffalo is an Equal Opportunity Employer/Recruiter.

### Swarthmore College

Computer Science Program, Swarthmore, PA 19081

Applications are invited for a tenure-track position and a two-year leave replacement position at the Assistant Professor rank to begin in August 2002. Swarthmore College is a small, selective, liberal arts college located in a suburb 10 miles outside of Philadelphia. The computer science program offers majors and minors in computer science at the undergraduate level. We have a CS laboratory of Sun workstations, a robot/operating-systems lab, and access to a campus network of Macintoshes and PCs. Both a Sun and Mac or PC will be provided in the office of the successful applicant. Applicants should have some teaching experience and be comfortable teaching a wide range of courses at the introductory and intermediate undergraduate level. Fluency in C, Scheme and one of C++ or Java is desired. Some preference will be shown to applicants who can involve undergraduate students in their research. For the tenure-track position an earned Ph.D. in CS by September 2002 is desired but ABD candidates will be considered. We will consider all subareas of CS. Areas of special interest are: Communications and Networking, Bioinformatics (from the CS side), Parallel Programming, and Programming Languages and Compilers. A resume and three letters of reference should be sent to Charles F. Kelemen at the above address. At least two of the letters should speak to the candidate's teaching ability. Swarthmore College is an Equal Opportunity Employer. Applications from women and members of minority groups are encouraged. We expect to begin interviewing in late January 2002. Applications will be accepted until the positions are filled.

### Texas A&M University

Department of Computer Science

*Faculty Search*

Texas A&M University has long enjoyed national leadership status in engineering education. Today, the Dwight Look College of Engineering is one of the largest and best endowed in the nation, and it ranks among the top institutions in every significant national poll.

The Department of Computer Science is one of the fastest-developing departments in the College. In recent years, it has built a strong national reputation based on the quality of its faculty and programs. The Department offers B.S., Master's and Ph. D. degrees in Computer Science and Computer Engineering. Currently we have 28 tenured and tenure track faculty, including five NSF PYI/NYI/CAREER award recipients. Current areas of research emphasis include real-time systems, robotics, artificial intelligence, machine learning, bioinformatics, computer-aided design, computer engineering, hardware/software co-design, software engineering, mobile computing, digital libraries, computer-human interaction, computational science, theoretical computer science, quantum computing, distributed systems and parallel computing. More information is available on the Web at <http://www.cs.tamu.edu>.

Candidates should have a Ph. D. in Computer Science or Computer Engineering or a closely related field, a strong commitment to both research and teaching, and demonstrated ability to perform research and acquire external funding appropriate to the rank being sought. The department welcomes applications from academic couples seeking to co-locate. Applications from minority and women candidates are especially encouraged. Texas A&M University is an affirmative action/equal

(cont'd)

## Professional Opportunities

opportunity employer committed to diversity.

Applicants should send a statement of research and teaching interest, a complete resume, and have at least three references send letters of recommendation by email to [faculty\\_search@cs.tamu.edu](mailto:faculty_search@cs.tamu.edu) or by hard copy to: Faculty Search Committee  
Department of Computer Science  
Texas A&M University  
College Station, TX 77843-3112.  
Applications will be accepted until the positions are filled.

**Texas A&M University**  
Department of Computer Science  
*Dwight Look College of Engineering*  
*College of Engineering Endowed Chair in Computer Science*

Texas A&M University invites nominations and applications for the College of Engineering Endowed Chair in Computer Science, whose endowment of \$4.3M is among the largest in the nation.

We are looking for an internationally recognized scholar who has the vision, enthusiasm, motivation, and capability to build and guide a flourishing research group. We are interested in candidates having synergistic interests with our existing areas of research strength as well as in candidates who will broaden and expand our current programs. We welcome applications from candidates with highly innovative research agendas and/or who cross traditional disciplinary boundaries. The Department, with the strong backing of the College and University, is committed to providing the resources needed to enable the Chair to quickly establish a vibrant, internationally recognized research presence at Texas A&M. The Department has significant uncommitted resources, including several faculty positions, that are available for this purpose. The University's recently completed Vision 2020 strategic plan includes an emphasis on Information Technology and on multidisciplinary initiatives such as

Bioinformatics; through the latter, the department has been awarded multiple positions split between Computer Science and other departments in the Life Sciences.

Texas A&M has long enjoyed national leadership status in engineering education. Today, the Dwight Look College of Engineering is one of the largest and best endowed in the nation, and it ranks among the top institutions in every significant national poll, including #11 in the recent US News and World report ranking.

The Department of Computer Science is one of the fastest-developing departments in the College. In recent years, it has built a strong national reputation based on the quality of its faculty and programs. The department offers B.S., Master's and Ph.D. degrees in computer science and, jointly with the Department of Electrical Engineering, in computer engineering. The department has 28 tenured or tenure-track faculty, including five NSF PYY/CAREER award recipients. More information is available at <http://www.cs.tamu.edu>.

Letters of application should include a full curriculum vitae and the names and addresses of at least five references. Applications will be accepted until the position is filled; screening will begin immediately. Nominations or applications should be sent to:

Endowed Chair Search Committee  
Department of Computer Science  
Texas A&M University  
College Station, TX 77843-3112  
e-mail: [chair\\_search@cs.tamu.edu](mailto:chair_search@cs.tamu.edu)

Applications from minority and women candidates are especially encouraged. Texas A&M University is an affirmative action/equal opportunity employer committed to diversity. The department welcomes applications from academic couples seeking to co-locate.

### United Technologies Research Center

Associate/Senior Research Engineer at UTRC

The Embedded Information Devices Group of the Systems and Networks Department at the United Technologies Research Center, East Hartford, Connecticut, invites qualified individuals to apply for multiple open positions in the area of communication protocols, embedded systems.

United Technologies Research Center (UTRC) is an internationally recognized R&D organization that conducts research across a broad range of technology areas to drive and support a corporate-wide "impact through innovation" agenda. The operating units of United Technologies Corporation (UTC) include Pratt & Whitney (aircraft engines and gas turbines for power generation), Sikorsky (helicopters), Otis (elevators), Carrier (heating and air conditioning), Hamilton-Sundstrand (aerospace products) and International Fuel Cells (fuel cell power plants). The mission of UTRC is to create opportunities for organic growth of UTC through innovation of new products and processes. UTRC partners with the best research organizations in the world and provides an opportunity for collaboration among academic and business unit partners.

Expertise in sought in the following areas:

Embedded Systems: Hardware and software development of distributed embedded systems, with focus on adaptive, dependable and real-time systems; Resource-constrained and scalable embedded systems; Communication protocols (TCP/IP, wireless, fieldbuses); Internet and application software design, Modeling and performance analysis of distributed embedded applications; Fault-tolerance, security, and safety-critical applications.

Communication Protocols: Communication infrastructure, distributed real-time systems and intelligent sensor networks; Modeling and analysis of complex industrial (mostly embedded) distributed applications Communication Protocols with emphasis on those commonly used in building automation and aerospace applications (including knowledge on wireless, powerline carrier, and wired protocols) Object-oriented middleware for distributed real-time applications.

Wireless Systems: Engineer - we are seeking professionals in this area. Areas of interest include, but are not limited to: RF system modeling, design and validation RF Communications channel modeling and analysis Wireless networks and communication protocols Performance modeling and analysis of wireless networks Power Control in wireless computer systems Physics-based modeling RF components specification and testing

The successful candidates will be responsible for conducting research including generation of concepts, assessing alternative solutions, and reducing the best concepts to practice. Additionally responsible for assisting program planning, technology transfer, and building group capability by assisting recruiting and mentoring. Must be capable of working independently, contributing as a member of a multidisciplinary team, and leading projects.

Qualifications: MS in Electrical or Computer Engineering, or related field and 3 or more years of experience in one or more of the areas noted above. Excellent communication skills are required. The successful candidate will have a documented record of technical achievement as evidenced by publications, patents, and/or fielded systems.

Preferred Qualifications: The preferred candidates will have a Ph.D. in Computer Science, Computer Engineering, Electrical Engineering or related field and 5 or more years of experience with a strong research focus in areas including computer and communication architectures, communication protocols and embedded hardware and software design methods, modeling and performance analysis of communication networks, RF system modeling including physics based and wireless networks and communications system design.

Strong applied mathematical abilities, knowledge of control systems, computer programming, and significant evidence of innovation-driven business success are additional preferred skills. Candidates with a wide and diverse range of experiences, multidisciplinary team participation, and innovation are highly valued.

In addition the preferred qualifications include: experience on distributed computing, specially with distributed object computing, component-based development of real-time embedded systems, fault-tolerant.

Potential candidates should send an email to: [employment@utrc.etc.com](mailto:employment@utrc.etc.com), reference code: Embedded -NET-2625-6403  
Communications- NET-2625-6572  
Wireless - NET-2625-6571.

### The University of Alabama at Birmingham (UAB)

Department of Computer and Information Sciences

Assistant/Associate Professor

The Computer and Information Sciences Department of the University of Alabama at Birmingham (UAB) invites applications from all areas of computer science for two tenure-track faculty positions at the assistant or associate professor level. Applicants should have a Ph.D. in computer science or a closely related field, a strong interest in and a commitment to teaching and research, and promise for securing external research funding. A goal of the Department is to develop a research team that builds on our existing academic strengths in bioinformatics and object-oriented distributed computing. Applicants should have research interests in one or both of these areas and a demonstrated record of accomplishments in a specialization such as distributed databases, component-based software, client-server computing and real-time and embedded software systems.

The Department of Computer and Information Sciences is located in the School of Natural Sciences and Mathematics and offers B. S., M. S., and Ph.D. degrees. UAB ranks among the top public institutions in the country in federal research and development support, attracting more than \$200-million in external funds and is ranked as a Carnegie Doctoral Research Extensive University. The UAB Medical Center is recognized as one of the nation's leading medical research institutions and is a source of collaboration in bioinformatics. For more information on the department, university and city, see our web page at [www.cis.uab.edu](http://www.cis.uab.edu).

Qualified applicants should send a curriculum vita and the names and addresses of three references to:

Faculty Recruiting  
Department of Computer and Information Sciences  
The University of Alabama at Birmingham  
CH 115A, 1530 3rd Avenue South  
Birmingham, AL 35294-1170  
or by email to [facapp@cis.uab.edu](mailto:facapp@cis.uab.edu).

Applications will be considered as they are received until the position is filled. The University of Alabama at Birmingham is an equal opportunity/affirmative action employer.

### The University of Arizona

Department of Computer Science  
<http://www.cs.arizona.edu>

Applications are invited for the position of Lecturer or Senior Lecturer beginning August 2002. Lecturer candidates must hold a graduate degree in computer science or closely related field, have a strong commitment to excellence in teaching, and must have substantial experience teaching computer science at the university level. Compensation is competitive, with rank and salary dependent on experience and qualifications. This is a non-tenured position, with appointments for fixed terms of three years; reappointment is possible subject to review. Duties of this position include teaching undergraduate computer science courses in systems software areas, machine organization and architecture, operating systems, data structures and programming languages. Duties also include academic advising of students, service on department committees involved in undergraduate life, and development of new curriculum and new instructional laboratories. Applicants must send a curriculum vita and the names of at least three references to:

Faculty Recruiting Committee  
Department of Computer Science  
The University of Arizona  
PO BOX 210077  
Tucson, AZ 85721-0077

A majority of the references should be able to comment directly upon the candidate's teaching experience and abilities. We will start the review of applications on January 15, 2002, and will continue to consider applicants until the position is filled, subject to availability of funds.

The University of Arizona is an EEO/AA employer - M/W/D/V.

### University of California, Davis

Department of Computer Science  
Faculty Positions

The Department of Computer Science, at the University of California, Davis, invites applications for several tenure-track faculty positions. The department is seeking candidates at all levels. At the senior level, we invite applications from candidates with truly distinguished records in research, teaching, and leadership; at the junior level, we invite applications from candidates with demonstrated research excellence and a commitment to excellence in teaching. The department welcomes applications from candidates in areas that emphasize innovative applications in computer science. It has a particular interest in the areas of Computer Systems (including operating systems, compilers, architecture, programming languages, and software engineering), Networks, Computational Biology, and Information Systems. We further encourage applicants whose research can both have impact in these core areas and leverage our extensive programs in graphics/visualization and security.

The Computer Science Department currently has 24 faculty members, covering all major areas of computer science. It is experiencing a period of strong growth in the size of its faculty and expects to continue this trend. The Davis campus is the third largest in the University of California system. UC Davis ranks among the nation's top 20 universities in research funding.

Davis is a pleasant, family-oriented community in a college town setting with excellent public schools and a mild climate. Davis is ideally located for many professional, cultural and recreational activities. It is just 15 miles from California's capital city of Sacramento and is within easy driving distance of the Silicon Valley, Berkeley, San Francisco, the Sierra Nevada Mountains, and the Pacific Coast areas.

These positions require a Ph.D. or equivalent. The positions are open until filled, but for full consideration, applicants should apply by January 14, 2002.

UC Davis is responsive to the concerns of dual career couples and offers a Partner Opportunity Program. UC Davis is an affirmative action/equal opportunity employer.

Please consult our web page (<http://www.cs.ucdavis.edu/employ>) for additional information on the particular areas of interest and application instructions.

### University of California, Irvine

Department of Information and Computer Science

The Department of Information and Computer Science at the University of California Irvine (UCI) <http://www.ics.uci.edu/> has several tenure-

track or tenured positions in the following research areas:

A. Human Computer Interaction  
B. Software Development  
C. Informatics in Biology and Medicine  
D. Cryptography  
E. Networked Embedded Systems F. Ubiquitous Computing

Positions are at the rank of assistant professor, but exceptional candidates at all ranks will be considered. ICS expects to grow substantially over the next decade and will be recruiting new faculty each year. Thus, outstanding candidates in other research areas are encouraged to contact us.

UCI is targeted as a growth campus for the University of California. It is the youngest of the existing UC campuses, yet ranked 10th among public universities. The Department of Information and Computer Science (ICS) was founded in 1968 in recognition of the emerging importance of computing. ICS is one of nine academic units at UC Irvine; as a free-standing department, it functions as a school. With more than 40 faculty members, 1400 undergraduates and 200 graduate students, ICS is the largest computing program within the University of California system as well as the fastest-growing major at UC Irvine.

ICS's mission is to lead the innovation of new information and computing technology and study its economic, commercial, and social significance while producing an educated workforce to serve as an economic engine for the advancement of technology. ICS has excellent faculty, innovative programs, high quality students and outstanding graduates as well as strong relationships with high tech industry. For a more detailed description of ICS and UC Irvine, see <http://www.uci.edu> and <http://www.ics.uci.edu>.

Electronic application instructions (highly preferred) can be found at:

<http://www.ics.uci.edu/about/jobs>

For those submitting paper application, a cover letter indicating the area (A-F) of primary research, a CV, three recent publications and letters from three to five references should be sent to:

Department of Information and Computer Science  
University of California, Irvine  
Irvine, CA 92697-3425  
Attention: Peggy Munhall

Application screening will begin immediately upon receipt of curriculum vitae. Maximum consideration will be given to applications received by December 7, 2001. The University of California, Irvine, is an Equal Opportunity Employer, committed to excellence through diversity.

### University of California, Los Angeles

Department of Computer Science

The Department of Computer Science in the Henry Samueli School of Engineering and Applied Science at the University of California, Los Angeles, invites applications for tenure-track positions in all areas of Computer Science and Computer Engineering. Applications are also strongly encouraged from distinguished candidates at senior levels.

The UCLA Campus administration is committed to significant growth in the faculty of Computer Science Department, with a projection of 3-4 new faculty members per year for the next five years.

Quality is our key criterion for applicant selection. Applicants should have a strong commitment to both research and teaching and an outstanding record of research for their level. We seek applicants in any mainstream area of Computer Science and Computer Engineering, but we particularly welcome those with a strength in systems, compilers, theory, and in interdisciplinary areas such as bioinformatics and electronic commerce.

Interested applicants should e-mail their CV and cover letter addressed to: Professor Milos Ercegovac, Chair, in two separate PDF files to [chair@cs.ucla.edu](mailto:chair@cs.ucla.edu). Please indicate field of interest. A list of four references with complete addresses, telephone numbers, and e-mail addresses should also be submitted in a text file.

The University of California is an Equal Opportunity/ Affirmative Action Employer.

### University of California, Riverside

Marlan and Rosemary Bourns College of Engineering

Faculty Positions in Computer Science & Engineering

The University of California, Riverside invites applications for tenure-track or tenured faculty positions in the Department of Computer Science and Engineering for the 2002-2003 academic year. Applicants must have a Ph.D. in Computer Science or in a closely related field. Systems specialties such as architecture, compilers, embedded systems, VLSI, networking, security, databases, operating systems, computer graphics, and software engineering, as well as the area of computational biology are of particular interest, but applications are welcome in all areas of Computer Science. Senior candidates must have an exceptional research and teaching record. Junior candidates must show outstanding research and teaching potential. Salary will be competitive, and

## Professional Opportunities

commensurate with appointment rank and qualifications.

UC Riverside is the fastest-growing member of the nine-campus University of California System, widely regarded as the most distinguished system of public higher education in the United States. The CSE department has now grown rapidly to 21 full-time faculty, and expects to grow to about 40 over the next six years. The Campus- and College-wide expansion programs include a new state-of-the-art building soon to house the CSE and EE departments. Annual research expenditures in the College are close to \$300K/year per faculty. The CSE department offers the B.S., M.S., and Ph.D. degrees. More information is available at <http://www.cs.ucr.edu>.

The city of Riverside, located about 60 miles away from Los Angeles, offers easy access to mountains, Pacific Ocean beaches, cultural activities, shopping, and other attractions. Applications and inquiries should be sent to:

Chair, Faculty Search Committee  
Department of Computer Science and Engineering  
University of California  
Riverside, CA 92521-0304  
(909)-787-5639 or by  
e-mail to: [hire@cs.ucr.edu](mailto:hire@cs.ucr.edu)

Applications must include curriculum vitae, list of publications, a statement of research and teaching objectives, and names and addresses of four references (junior candidates may have reference letters mailed directly to the department). Formal review of applications begins January 18, 2002, but positions will remain open until filled. Early applications are encouraged. The University of California, Riverside is an Equal-Opportunity, Affirmative-Action Employer.

### University of California at San Diego

Department of Computer Science and Engineering

#### Tenured and Tenure-track Positions

The Department of Computer Science and Engineering has several tenured and tenure-track faculty positions open for Fall, 2002. We invite applications at all levels in all areas of computer science and computer engineering. Areas of particular interest include computational molecular biology and bioinformatics, Internet technologies, embedded systems, distributed systems, networks, databases, software engineering, artificial intelligence, computer graphics and visualization, security, computer architecture, algorithms, programming languages as well as storage systems and networks. However, excellent candidates in all areas will be seriously considered.

The department is in a period of exciting growth and has attracted extraordinary faculty in the past few years. It has excellent research programs in computer science and computer engineering as well as a strong interdisciplinary research program in computational biology and bioinformatics. It plays a leading role in the newly formed California Institute for Telecommunications and Information Technology, the San Diego Supercomputer Center, and has close ties to the Center for Wireless Communications. For more information, please consult our web page <http://www-cse.ucsd.edu>.

The department is looking for applicants with outstanding research credentials. Successful applicants are expected to lead a vigorous research program and to have a strong commitment to teaching. A Ph.D. in computer science or a related area is preferred. Salary and rank will be commensurate with qualifications in conformance with University of California policies.

#### Lecturer Positions

The department invites applications for part-time and full-time lecturer positions in all areas of computer science and computer engineering. Demonstrated excellence in teaching is a requirement. Appointments may be made for part time or full time, for one quarter, two quarters, or for the full academic year, with a possibility of renewal. In particular, we also invite applications from experienced instructors for a possible senior full-time Lecturer position with teaching and administrative responsibilities, with the potential of Security of Employment, for which a Ph.D. degree is strongly desirable.

We encourage candidates to send applications as soon as possible. Faculty applications received by January 7, 2002, will be given full consideration. Applications for lecturer positions are considered throughout the year.

Please send a letter of interest, curriculum vitae including research interests and plans, the names and email addresses of at least four references to the Recruiting Chair ([recruit@cs.ucsd.edu](mailto:recruit@cs.ucsd.edu)), and cite the position reference number 3-905. Email submission with PDF, Word or text attachments is preferred. Hard copy can be sent to:

Recruiting Chair  
Dept of Computer Science and Engineering-0114  
University of California, San Diego  
La Jolla, CA 92093-0114  
UCSD is an Equal

Opportunity/Affirmative Action Employer; women and minority applicants, veterans and persons with disabilities are encouraged to apply.

### University of California, San Diego Supercomputer Center (SDSC)

As a national leader in computational science and engineering, the San Diego Supercomputer Center (SDSC) houses advanced computing and networking resources and conducts research in computing technologies and computational sciences such as biology, chemistry, and environmental science.

SDSC's projects are as diverse as the individuals who comprise our staff, and we maintain an entrepreneurial environment where everyone has a say. SDSC is the leading-edge site for data-intensive computing, the National Partnership for Advanced Computational Infrastructure and home to many other exciting research projects including the Protein Data Bank, the Cooperative Association for Internet Data Analysis, many digital library and digital archive projects and now a Distributed Terascale Facility.

Overlooking the blue waters of the Pacific Ocean, the campus at UC San Diego offers one of the most beautiful working environments you could imagine. Contact us to see how you could benefit by joining the "employer of choice of San Diego"... and continue to enjoy a more balanced, productive life while enhancing your career.

We are actively seeking applicants in the following and other areas of information and computing technology:

Associate Director for Scientific Computing; Associate Director for Networking and Computer Security; Distributed Computing Specialists; Scientific/Biomedical Programmers; Network Researchers/Engineers; Data Warehouse Specialists; High Performance Computing Analyst/Training Coordinator; Technical Managers; System Administrators; Web Developers/Engineers; Java and Perl Programmers; Software Engineers; Chief Engineers; Technical Writers/Editors; Scientists.

Michael Dean Galvin  
Outreach Recruitment, San Diego Supercomputer Center  
University of California, San Diego  
9500 Gilman Drive  
La Jolla, CA 92093  
phone: 858-822-3695  
fax: 858-822-3355  
Please apply directly to: [michaalg@sdsc.edu](mailto:michaalg@sdsc.edu)  
[www.sdsc.edu](http://www.sdsc.edu)

### University of California, Santa Cruz

Baskin School of Engineering

Seeks qualified applicants for faculty positions in:

Computer Engineering  
Computer Science  
Electrical Engineering  
Positions available at the Assistant, Associate and Full Professor levels.

For complete information on all positions, see <http://www.soe.ucsc.edu/events/jobs>  
Fax: 831-459-4829

UCSC is an EEO/AA/IRCA Employer

### University of Connecticut

Computer Engineering Faculty Search  
Electrical & Computer Engineering Department

The Department of Electrical & Computer Engineering (ECE) at the University of Connecticut invites nominations and applications to fill two tenure track faculty positions in Computer Engineering at the assistant or associate professor level. Candidates with research interests in computer architecture, hardware-software co-design, computer networks, digital system design and testing, real-time and embedded systems, and fault tolerant and re-configurable computing are sought. Necessary qualifications include an earned doctorate in Electrical Engineering or Computer Engineering, a strong commitment to effective teaching including laboratory development, outstanding scholarly research achievement, and potential to attract external funding for research. Applicants with exceptional credentials may be considered for named young endowed professorship with an endowment of \$500,000.

The ECE Department is staffed with 17 faculty members, and has full-time enrollments of 110 undergraduates and 90 graduate students. The faculty is internationally renowned with 6 IEEE Fellows, two Editors-in-Chief of IEEE Transactions, and more than 10 other Editorial positions. Departmental research activities attract over \$4 million in annual funding, are broad in nature, and encompass biomedical engineering, computer engineering, communications, digital signal and image processing, control and estimation theory, manufacturing, microelectronics, optoelectronics, photonics, and systems engineering. In the past three years, the Department has graduated an average of 12 Ph.D. students per year.

The Department has extensive, well-equipped labs for graduate and undergraduate teaching and research including a state of the art VLSI design laboratory and a class 100 clean room. It maintains strong ties to interdisciplinary research centers for Material Science, Photonics, Computer Applications, Transportation, and Electrical Insulation, which provide facilities and services for faculty and graduate student research and extensive

interaction with industry. The School of Engineering is ranked 26th among public universities in research expenditures and has recently established 17 new endowed chairs/named professorships. Several are available to the ECE Department. In addition, the University has approved construction of a new, 100,000 sq. ft. Information Technology building to be completed in December 2002 to house the ECE and CSE departments. This construction is part of UConn 2000, an ongoing \$1 billion infrastructure initiative. The University is located in Eastern Connecticut with convenient access to major airports and the metropolitan areas of Hartford, Boston, and New York.

Send application or nomination letter, resume, and the names of three references to:  
Dr. John Enderle, Chair of ECE  
Computer Engineering Faculty Search Committee  
ECE Department, University of Connecticut

260 Glenbrook Road, Unit 2157  
Storrs, CT 06269-2157  
Phone: 860-486-5521  
Fax: 860-486-2447  
email: [jenderle@bme.uconn.edu](mailto:jenderle@bme.uconn.edu)  
URL: <http://www.ee.uconn.edu>

The review of applications will proceed on their arrival. The expected starting date is August 2002 or as soon as possible. The search will continue until the positions are filled. The University of Connecticut is an Equal Opportunity Affirmative Action Employer.

### University of Connecticut

Senior Faculty Position in Computer Science and Engineering

The University of Connecticut invites nominations and applications with strong leadership qualities for a senior faculty position in computer science and engineering. This position offers an excellent opportunity for the creation of a nationally recognized and cutting-edge program emphasizing engineering applications of information technology. The focus and direction of the program will clearly be influenced by the strength, preference and leadership of the applicant. The School of Engineering enjoys a synergistic relationship with broad industrial and research communities. It has already obtained an initial funding of \$750,000 from GE Foundation's generous donation for the support of this newly created position.

The Computer Science and Engineering Department has strong research and education programs in areas including distributed computing, networks, intelligent systems, agent-based computing, parallel algorithms, complexity theory, data security, cryptography, geometric modeling, databases, computational biology, performance modeling and human-centered computing. The CSE faculty are funded by NSF, AFOSR, NIH, DARPA, MITRE, and other industrial and government agencies. The selected candidate will enjoy collaboration with highly qualified and motivated faculty members in the department and in the School of Engineering for the program development.

The University of Connecticut, a land grant university and the State's flagship public university, is one of only two public universities in New England designated a Carnegie Foundation Research I institution. The University is rated as the number one public university in New England by U.S. News & World Report. The University was founded in 1881 and is undergoing a remarkable physical transformation thanks to a \$1 billion, 10-year capital initiative aimed at rebuilding the campus to meet the demands and opportunities of the 21st century.

Please send applications and nominations to:  
Professor T.C. Ting, Chair  
Senior Faculty Search Committee  
Department of Computer Science and Engineering  
Unit 3155, University of Connecticut  
191 Auditorium Road  
Storrs, CT 06269-3155  
e-mail: [ting@enr.uconn.edu](mailto:ting@enr.uconn.edu)  
phone: (860) 486-3784;  
fax: (860) 486-4817

The University of Connecticut is an Affirmative Action/Equal Opportunity Employer. (Search #01A241)

### University of Delaware

Department of Computer and Information Sciences

Applications are invited for multiple tenure track Assistant Professor positions to begin Fall 2002. Outstanding candidates for senior level positions are also encouraged to apply. Of primary interest are candidates whose research is in systems, software engineering, graphics, visualization, vision, speech processing, data mining, databases, bioinformatics, or security. Applicants should hold a Ph.D. or its equivalent, and should be committed to excellence in research and teaching. The normal teaching load is three courses per year.

The Department has 16 tenure-track and 3 research faculty members, with a substantial portion of our 100 graduate students pursuing the Ph.D. We have significant external funding, including NSF Career Awards, a \$2.2M grant in Communications and Networks that

is part of the Army Research Labs Collaborative Technology Alliance, and an NSF CISE Research Infrastructure Grant for parallel and distributed computing. A major UDel biotechnology initiative (<http://www.dbi.udel.edu>) offers opportunities for collaborative research in bioinformatics. The University of Delaware is centrally located between Philadelphia and Baltimore, with major government and industrial labs nearby. Considerable information about the Department is available at <http://www.cis.udel.edu>.

To apply, please mail a curriculum vitae to:

Dr. Errol Lloyd  
Chair of the Faculty Search Committee  
Department of Computer and Information Sciences  
University of Delaware  
Newark, DE 19716

In addition, candidates should have three confidential letters of reference sent directly to either (but not both) the above address or [csfacsch@cis.udel.edu](mailto:csfacsch@cis.udel.edu). Applications will be accepted until the positions are filled; those received by February 1, 2002 are assured full consideration. Qualified minority group members and women are encouraged to apply.

The University of Delaware is an equal opportunity employer.

### University of the District of Columbia

School of Engineering and Applied Sciences

Faculty Positions (Announcement Number 01-42)

The Department of Computer Science seeks applications for Assistant Professor positions and above; rank is based on qualifications and experience. Duties include teaching and laboratory instruction in Computer Science and related programs. Additional duties include developing proposals for funding in support of the instructional mission and research, as well as involvement in student recruitment and advising.

Qualifications required are a Ph.D or terminal degree in Computer Science, or closely related engineering discipline. Preferred specialties are networks, operating systems, artificial intelligence, content processing, embedded software development and graphics. Breadth in the field is of prime importance. Experience with ABET/CSAB accreditation, student recruitment and retention and demonstrated efficiency in curriculum development is a plus.

UDC is located in the northwest section of Washington, DC, surrounded by embassies and historic Rock Creek Park. It is the only urban land-grant university in the nation and an HBCU member. The position is open until filled. Please submit a curriculum vitae, undergraduate and graduate transcripts and three letters of recommendation to:

Ms. Isabelle McMillian  
University of the District of Columbia  
Office of Personnel Management  
Building 38, Suite 301  
4200 Connecticut Avenue, NW  
Washington, DC 20008

UDC is an equal opportunity employer and does not discriminate on the basis of disability (P.L. 93-122).

### University of Florida

Department of Computer and Information Science and Engineering

#### Lecturer Positions

Applications are invited for multiple lecturer positions in the Computer and Information Science and Engineering Department at the University of Florida, Gainesville. Lecturer candidates must hold a graduate degree in computer science, computer engineering, or a closely related field. Candidates should have a strong commitment to excellence in teaching, and must have experience teaching computer science at the university level.

The Department of CISE currently has a faculty of 29 and a student body of 320 graduate and 1500 undergraduate students. The Department encompasses a wide range of research areas including high performance computing, database systems, computer vision, computer graphics, and simulation, computer networks and security, distributed and real-time systems, and software engineering.

Applicants for these positions must send a curriculum vitae and at least three letters of recommendation to:

Chair, Faculty Search Committee  
c/o Robyn Edwards  
Dept. of CISE 301 CSE, PO Box 116120  
Univ. of Florida  
Gainesville, FL 32611  
email: [search@cise.ufl.edu](mailto:search@cise.ufl.edu)  
Tel: 352-392-1212

Application deadline is October 30, 2001. If initial search does not result in a successful applicant pool, rolling application deadlines will be November 30, 2001 and February 15, 2002.

The University of Florida is an Affirmative Action Employer and women and minorities are encouraged to apply. For more information about the department and positions, please visit <http://www.cise.ufl.edu>

## Professional Opportunities

### The University of Georgia

Department of Computer Science

The Department of Computer Science at The University of Georgia invites applications for tenure-track positions at all levels to begin Fall of 2002. Successful applicants must be committed to excellence in both research and teaching.

One or two positions will be dedicated to a Georgia strategic initiative (Yamacraw), designed to make Georgia a world leader in the design of broadband communications systems, devices and chips. Relevant research areas include networking, operating systems, distributed systems, mobile computing, architecture, or programming languages and compilers. Currently, the department has an experimental systems research group of five faculty with research interests spanning these areas.

One of the other positions is to be filled by a senior person qualified to participate in the campus-wide program in computational biology and bioinformatics. The department intends to hire persons whose research complements existing departmental strengths. We are especially interested additionally in algorithms, theory, and graphics.

The Department of Computer Science is a growing and congenial department of 23 faculty with wide areas of research interests. The department has 500 undergraduate and 80 graduate students and offers the B.S., M.S., and Ph.D. degrees in computer science. The teaching load allows for substantial concentration on research. Faculty interact with several centers for computational science, including centers for Genomics and Computational Biology, Molecular Structure and Design, Complex Carbohydrate Research, Computational Quantum Chemistry, and Simulation Physics.

The University of Georgia, founded in 1785, is the oldest land-grant university in the nation and the largest university in the state of Georgia, with a student body of 31,000. Located in Athens, a charming and historic university town of 100,000, approximately 65 miles from metropolitan Atlanta, with mild winters and warm summers, the University boasts a major Performing Arts Center, the country's best fitness and exercise facility for students and faculty, and was recently ranked in the top 20 public universities by U.S. News and World and Report.

Applicants should submit a vita and a statement of research interests and arrange to have three reference letters sent to:

David Gries  
Faculty Search Committee Chairman  
Department of Computer Science  
The University of Georgia  
Athens, GA 30602-7404

To be assured full consideration, applications should be received by January 15, 2002. The University of Georgia is an equal opportunity/affirmative action employer, and especially encourages applications from women and minorities.

### University of Illinois at Chicago

Department of Computer Science Faculty Positions

We invite applications for assistant, associate and full professors as well as lecturers. A Ph.D. degree in Computer Science or its equivalent is required for tenure-track positions. A master's degree in Computer Science is required for the lecturer position. Outstanding candidates in all areas of Computer Science will be considered. All candidates should have outstanding teaching and research potential.

UIC is a research-1 university and the largest institution of higher education in the Chicago area. The University is in the midst of a \$500 million campus development project. The Department of Computer Science has 31 faculty members and 250 graduate students, and offers BS, MS, and Ph.D. degrees. It has annual research expenditures of \$4.5 million. The department has six IEEE, ACM fellows and four NSF career award winners on its faculty. It has state of the art computing resources for research and teaching. It is one of the fastest growing departments in terms of scholarly research and grant productivity. For more information, visit our web page at <http://www.cs.uic.edu>.

The UIC campus is located near downtown Chicago, and is close to other research institutions and universities. Chicago offers all the cultural amenities of a major city, a wide range of affordable housing and plenty of job opportunities. For full consideration, send a vita and the names and addresses of at least three references by January 31, 2002 to:

Prof. A. Prasad Sistla  
Search Committee Chair  
Dept. of Computer Science (M/C 152)  
851 S. Morgan Street  
Chicago, Illinois 60607-7053

Applications will be considered until all positions are filled. The University of Illinois at Chicago is an Affirmative Action/Equal Opportunity Employer.

### University of Louisiana at Lafayette

The Center for Advanced Computer Studies

Faculty Positions; Graduate Fellowships

Candidates with a strong research record and an earned doctorate in computer science or computer engineering are invited to apply for tenure track faculty positions at both the assistant and associate professor levels starting August 14, 2002 (starting spring, 2002 is also available). Target areas include computer networks, communications, programming languages, software engineering, and information and database management systems. Consideration will also be given to outstanding candidates in other areas. The candidate must have demonstrated potential to achieve national visibility through accomplishments in research contract and grant funding, publications, teaching and supervising graduate students.

Faculty teach mostly at the graduate-level and offer a continuing research seminar. State and university funds are available to support research initiation efforts. External grants/contracts from federal and state agencies support the Center's ongoing research (over \$4.5M in 1998-99). Salaries are competitive along with excellent support directed towards the attainment of our faculty's professional goals. The Center's colloquium series brings many world known professionals to our campus each year.

#### FELLOWSHIPS:

A number of PhD fellowships, valued at up to \$18,000 per year including tuition and most fees, are available. They provide support for up to four years of study towards the PhD in computer science or computer engineering. Eligible candidates must be U.S. citizens or must have earned an MS degree from a U.S. or Canadian university. Recipients also receive preference of low-cost campus housing.

#### THE CENTER:

The Center is primarily a graduate research unit, of 15 faculty, with programs leading to MS/PhD degrees in computer science and computer engineering. More than 230 graduate students are enrolled in these programs, including 65 PhD students. The Center has state-of-the-art research and instructional computing facilities, consisting of several networks of SUN workstations and other high performance platforms. In addition, the Center has dedicated research laboratories in Computer Vision and Pattern Recognition, Intelligent Robotic Systems, Software Research, VLSI Design, Automated Reasoning, Multimedia Applications, Wireless Communication, Mobile Information Technologies, Internet Computing, and NASA Regional Applications Center (RAC). Related university programs include the CSAB accredited undergraduate program in Computer Science Department, and the ABET accredited undergraduate program in Electrical and Computer Engineering Department. Additional information about the Center may be obtained at <http://www.cacs.louisiana.edu/>.

#### THE UNIVERSITY:

The University of Louisiana at Lafayette is the second largest university in the state of Louisiana, with enrollment of about 16,000 students. It is a Doctoral II university. Additional information may be obtained at <http://www.louisiana.edu/>. The University is located in Lafayette, the capital of Acadiana, which is characterized by its Cajun music and food, and joie de vivre atmosphere. The city, with its population of over 120,000, provides many recreational and cultural opportunities. Lafayette is located approximately 120 miles west of New Orleans.

The search committee will review applications and continue until the position is filled. Candidates should send a letter of intent, curriculum vitae, statement of research and teaching interests, and names, addresses and telephone numbers of at least four references. Additional materials, of the candidate's choice, may also be sent to:

Dr. Magdy A. Bayoumi, Director  
The Center for Advanced Computer Studies  
University of Louisiana at Lafayette  
Lafayette, LA 70504-4330  
Tel: 337.482.6147  
Fax: 337.482.5791

The University is an Affirmative Action/Equal Opportunity Employer.

### University of Maine

Faculty Positions in Computer Science

Our expanding department invites applications from people interested in a tenure-track position at the assistant or associate professor level starting September 2002. One position has been approved and another is likely to be approved. These positions are part of a planned expansion of the faculty over the next several years. Rank at time of appointment is dependent upon qualifications and experience.

A Ph.D. in Computer Science or related discipline is required. Candidates should exhibit a strong commitment to teaching and solid research potential. Preference will be given to candidates with a strong background in database systems, distributed and parallel systems, digital communications/networking operating systems, or programming languages. Responsibilities include graduate and under-

graduate teaching, the establishment of a program of independent or collaborative research with support from external funding agencies, and involvement of graduate/undergraduate students through dissertations, theses, and/or project work.

The University of Maine is the primary graduate institution in the State of Maine. The Department of Computer Science offers BA, BS, MS, and Ph.D. degrees in Computer Science. Current research areas of our department include algorithms, artificial intelligence, agents, software engineering and reuse, combinatorics, crisis management, learning environments, networking, and finite-element modeling. The Department has organized an institute to focus on agent-based computing. The University also has strong programs in Spatial Information Science and Engineering, and Electrical and Computer Engineering. We are actively seeking individuals whose research has interdisciplinary components or potential. The Department has strong ties to Jackson Laboratory, the National Center for Geographic Information and Analysis, and the Maine Software Developers Association. Our Web site can be visited at [www.cs.umaine.edu](http://www.cs.umaine.edu).

The University of Maine is located one hour from the beautiful Bar Harbor area, which includes Acadia National Park, and approximately the same distance to skiing and remote hiking areas. The area provides a pleasant, safe, and affordable living environment. Extensive cultural activities are available at the Maine Center for the Arts and in the greater Bangor area.

Salary and startup support packages are competitive. Applicants should send a letter of application, a statement of research interests, a resume, and three letters of reference to:

Prof. George Markowsky, Chair  
Department of Computer Science  
5752 Neville Hall  
Orono, ME 04469-5752

Review of applications will begin January 15, 2002 and continue until the position is filled. We encourage applications from women and under-represented minorities. The University of Maine is an Equal Opportunity/Affirmative Action Employer.

### University of Maryland, College Park

Center for Bioinformatics and Computational Biology

DIRECTOR and NINE FACULTY

The University of Maryland invites faculty applications at all levels for the newly established Center for Bioinformatics and Computational Biology. The campus has committed substantial resources to the Center, including funds for the recruitment of nine new faculty including a Director. It is anticipated that the primary specialization areas of the new faculty will collectively span the fields of computer science, mathematics and statistics, molecular biology, molecular evolution/phylogeny, and biochemistry. The primary responsibility of the new faculty will be to lead a nationally visible research program in selected areas of computational genomics, proteomics and molecular evolution, complementing existing strengths at the University of Maryland. Candidates for the Director position are expected to be senior researchers with prominent recognition in these areas.

All the new faculty will be housed in contiguous space set aside for the Center, and will have access to significant high-end computing infrastructure through the University of Maryland Institute for Advanced Computer Studies. Each will also be affiliated with at least one other campus academic unit appropriate to her/his interests. There is ample potential for collaboration with other outstanding bioinformatics research groups nearby, in organizations such as NIH, Celera, TIGR, the Maryland Biotechnology Institute, and the Smithsonian Institution. To apply, send a letter of application, curriculum vitae, and URL for additional information to [cecilia@umiacs.umd.edu](mailto:cecilia@umiacs.umd.edu), and have at least 3 letters of recommendation sent to:

Cecilia Kullman  
Center for Bioinformatics and Computational Biology  
Institute for Advanced Computer Studies  
2131 A.V. Williams Bldg  
University of Maryland  
College Park, MD 20742

The University of Maryland is an affirmative action, equal opportunity employer. Women and minorities are encouraged to apply. Applications will be accepted until the positions are filled.

### The University of Maryland, College Park

Department of Computer Science

The Department of Computer Science is seeking faculty members at all ranks. Truly outstanding candidates in all areas will be considered, but we are especially seeking candidates in the areas of: Computer Vision, Networks, Mobile Computing, Multimedia Systems, Graphics, Human-Computer Interaction, Databases, Information Security, Programming Languages and Software Engineering, Theory of Computing.

Candidates with established research programs will be considered for joint appoint-

ments between the Department and the Institute for Advanced Computer Studies, The Department of Electrical Engineering, and the Institute for Systems Research.

Candidates who are interested should send curriculum vitae, research summary, and the names of at least four references (3) emphasizing research and (1) emphasizing teaching to:

Attention: Faculty Recruiting Committee  
University of Maryland at College Park  
Department of Computer Science  
College Park, Maryland 20742-3255

At the time they apply, candidates must request their references to send written recommendations. Failure to do so will delay the application process. We will begin the review of candidates to be interviewed in January and therefore encourage your early application.

Additional information about academic and research units within the Department of Computer Science at the University of Maryland is available at our web site: <http://www.cs.umd.edu>

The University of Maryland is an Equal Opportunity, Affirmative Action Employer.

### University of Massachusetts, Amherst

Department of Computer Science

Faculty and Research Scientist Positions

The University of Massachusetts, Amherst invites applications for tenure-track faculty positions at the assistant professor level.

Applicants must have a Ph.D. in Computer Science or related area and should show evidence of exceptional research promise. Candidates with an established record of strong research may also apply for positions other than at the assistant professor level. Candidates in all areas of Computer Science are encouraged to apply, but we are particularly interested in computer vision, robotics, computer architecture, and foundational and emerging areas of software. We particularly welcome candidates who would thrive in a highly collaborative environment in which projects often span several research groups.

The Department of Computer Science has 37 tenure and research track faculty and 170 Ph.D. students with broad interdisciplinary research interests. The department offers first-class research facilities and has just moved into a new state-of-the-art building. Please see <http://www.cs.umass.edu> for more information. Applications should reference search R12389.

We also invite applications for Research Faculty (R12390), Research Scientist (R12391), Postdoctoral Research Associate (R12391), and Research Fellow (R12391) positions in all areas of Computer Science. Applicants should have a Ph.D. in Computer Science or related area (or an M.S. plus equivalent experience), and should show evidence of exceptional research promise. These positions are grant-funded; appointments will be contingent upon continued funding.

To apply, send a letter with your vitae and at least three letters of recommendation to:

Search (fill in number from above)  
c/o Chair of Faculty Recruiting  
Department of Computer Science  
University of Massachusetts  
Amherst, MA 01003-4610

We will begin to review applications on November 1, 2001, and will continue until available positions are filled. Salary commensurate with education and experience; comprehensive benefits package.

Inquiries and requests for more information can be sent to: [facrec@cs.umass.edu](mailto:facrec@cs.umass.edu)

The University of Massachusetts is an Affirmative Action/Equal Opportunity employer. Women and members of minority groups are encouraged to apply.

### UMass Lowell

Department of Computer Science

The Department of Computer Science at the University of Massachusetts Lowell seeks scholars with exceptional records or, for junior appointments, with exceptional potential to expand our suite of research groups. We invite applications for several tenure-track faculty positions to start in January 2002 or September 2002, from applicants with specialties in traditional or innovative areas of computer science. We anticipate hiring at the assistant professor level, but will consider candidates at all levels.

Our campus is located 35 miles northwest of Boston in the state's high-tech corridor and is considered the most technology-oriented of the five UMass campuses. The CS department had 18 full-time faculty, as well as over 400 undergraduates in our accredited bachelor's program and over 250 graduate students in the master's and doctoral programs. Our research specialties include human-computer interaction, visualization and perception, bioinformatics, database systems, networking and telecommunications, languages and compilers, object-oriented software engineering, internet and web systems and newly formed groups in computational complexity, computational geometry, network and system security, and robotics and assistive technology. For more information about us, please visit: [www.cs.uml.edu](http://www.cs.uml.edu).

We are seeking candidates who will contribute to the intellectual life of the department, the university and the region by establishing active research groups, teaching

## Professional Opportunities

core and elective computer science courses to undergraduate and graduate students, and establishing professional connections with the some of the thousands of thriving information technology companies in the area.

Applicants must have a doctorate in Computer Science or a closely related discipline at the time of appointment. Please send a statement of research interests; curriculum vitae; selected relevant papers; the names, addresses, email addresses, and telephone numbers of at least three references; and, if appropriate, your residency status to:

Dr. Thomas M. Costello, Head  
Department of Computer Science  
University of Massachusetts Lowell  
One University Avenue  
Lowell, Massachusetts 01854  
tom@cs.uml.edu

Review of applications will begin immediately and continue until the positions are filled. U. S. citizenship or permanent residency is required. The University of Massachusetts is an equal opportunity, affirmative action employer, and encourages applications from women and minorities.

### University of Miami

Department of Computer Science  
*New tenure-track faculty positions*

The Department of Computer Science at the University of Miami seeks to hire new tenure-track faculty. At least one appointment is envisioned at the rank of Assistant Professor, and at least one at the rank of Associate Professor. Candidates must hold a doctorate in computer science or a related field, and must demonstrate strong potential for excellence in research and teaching. Rank and salary are commensurate with qualifications.

The Department of Computer Science is a newly established department, recently separated from the combined Department of Mathematics and Computer Science. The successful candidate will show the desire to shape the future of this budding department. The University of Miami is a Group I research university as well as a member of the next-generation Internet (Internet2) project. For more information on the department and the university, please visit our web site at [www.cs.miami.edu](http://www.cs.miami.edu).

Applicants should send a letter of application, curriculum vitae, research statement, teaching statement, and the names of three references to:

Victor Milenkovic, Department Chair  
Faculty Search Committee, Department of  
Computer Science  
University of Miami, P. O. Box 248154  
Coral Gables, FL 33124-4245  
or via email to [csearch@cs.miami.edu](mailto:csearch@cs.miami.edu)

Please include in your letter of application a URL containing supporting material, such as online publications. Electronic submissions are strongly encouraged.

Review of applications will begin immediately and continue until positions are filled. Women and minorities are encouraged to apply. The University of Miami is an Affirmative Action/Equal Opportunity Employer.

### University of Michigan in Ann Arbor

Electrical Engineering and Computer Science  
*Chair*

The Department of Electrical Engineering and Computer Science (EECS) in the College of Engineering at the University of Michigan in Ann Arbor is initiating a search for a chair. The qualified candidate should possess outstanding leadership and administrative capabilities, an established record in research and teaching, and an earned doctorate in areas relevant to electrical engineering, computer engineering or computer science. The candidate should have a clear understanding of the present status of the profession and a vision of the future needs of electrical engineering, computer engineering and computer science education. The Department has been extremely active and successful in conducting multi- and cross-disciplinary research within the College and the campus. The candidate should be able to cross traditional disciplinary boundaries to nurture the present activities and foster future research and educational synergies across other departments, institutes, and centers within the College of Engineering and the University overall.

The candidate should have strong abilities in promoting sponsored research programs, leading development activities, and interacting with government, industry, and professional societies. The qualified candidate should be able to lead and support the faculty to ensure that the highest academic standards are maintained for undergraduate and graduate education, and undergraduate and graduate research. The candidate should be able to work with a diverse group of faculty, staff, students, and administrators to achieve common goals and to maintain an effective rapport with alumni and industry representatives. In addition, the candidate must be able to manage a large staff and budget.

The Department is highly regarded nationally, with approximately 90 tenured or tenure-track professorial faculty, 5 full-time lecturers,

20 primary research scientists, 900 undergraduate and 600 graduate students. It is equipped with state-of-the-art laboratories, physical facilities and support infrastructure, computing organization and facilities, and an easily accessed library. The Department has diverse educational and research programs with strong interdisciplinary collaborations. The research programs include an Engineering Research Center and several other multi-disciplinary and multi-investigator programs. The current annual research expenditures are approximately \$34M. More information can be obtained from the Department's home page at <http://www.eecs.umich.edu/>.

The position is expected to be filled by September 2002. Interested persons should send a letter by March 1, 2002, along with a detailed curriculum vitae and the names and addresses of three potential references to:

Chair, EECS Chair Search Advisory Committee  
1221 Beal Avenue, ADA-2466 LEC  
College of Engineering, University of Michigan  
Ann Arbor, MI 48109-2102

Letters nominating likely candidates are also encouraged. The University of Michigan is an Equal Opportunity Affirmative Action Employer. Women and minority candidates are especially encouraged to apply.

### University of Michigan, Ann Arbor

Department of Electrical Engineering and Computer Science  
*Computer Science and Engineering Division Faculty positions*

Applications and nominations are solicited for several junior and senior faculty positions in the Computer Science and Engineering (CSE) Division. Qualifications include an outstanding academic record, a doctorate or equivalent in computer engineering or computer science, and a strong commitment to teaching and research. Candidates from all areas of computer science and engineering will be considered.

The University of Michigan is a Non-Discriminatory/Affirmative Action Employer. Please send resume and names of three or more references to:

Professor John E. Laird, Assoc. Chair  
CSE Division  
Department of Electrical Engineering and Computer Science  
University of Michigan  
1301 Beal Avenue, Room 3402  
Ann Arbor, MI 48109-2122  
URL: <http://www.eecs.umich.edu/cse>  
You may submit applications and inquiries via email to [csearch@eecs.umich.edu](mailto:csearch@eecs.umich.edu)

### University of Minnesota - Twin Cities

Department of Computer Science and Engineering  
*Faculty Positions*

The Department of Computer Science and Engineering at the University of Minnesota invites applications for several open faculty positions. These positions are primarily at the assistant professor level, but highly qualified applicants at higher ranks will also be considered. Specialists from all areas of computer science and engineering are encouraged to apply. Requirements include a Ph.D. in computer science, computer engineering, or a closely related discipline, a commitment to quality teaching, and the potential for carrying out outstanding research. Senior candidates must possess a distinguished record of teaching, research, and service.

The research and teaching missions of the Department encompass a wide range of areas, including networking and distributed multimedia, internet technologies, databases, data mining, software engineering, computer architecture, compilers, programming languages, artificial intelligence, robotics and computer vision, computer graphics and visualization, algorithms and complexity theory, geometric computing and applications, human-computer interaction, parallel computing, and scientific computing.

Its faculty members, numbering thirty, have access to outstanding computing facilities both within the Department and at the various research centers on campus, including the Army High Performance Computing Research Center, the Minnesota Supercomputing Institute, and the Institute for Mathematics and its Applications. The Department is poised to play a prominent role in the Digital Technology Center, which is scheduled to be operational at the University in Spring 2002. External research funding in the department has grown steadily over the past several years and recently topped \$4.1 million. Additional information about the Department is available at its World Wide Web home page: <http://www.cs.umn.edu>. The Minneapolis-St. Paul area is a major center for the computer industry and for advanced technology, and the Department enjoys strong interactions with local industries.

Applicants should submit a curriculum vitae, a research summary, and the names of at least three references to:

Chair, Faculty Recruiting Committee  
Department of Computer Science and Engineering  
University of Minnesota  
4-192 EE/CSci Building  
200 Union St. S. E.  
Minneapolis, MN 55455

Electronic submissions of applications are welcome and may be sent via e-mail to [applications@cs.umn.edu](mailto:applications@cs.umn.edu). (Electronic submissions must be in Postscript or PDF formats.) Review of completed applications will begin December 1, 2001, but the search will remain open until all positions are filled.

The University of Minnesota is an equal opportunity educator and employer.

### University of Mississippi

Department of Computer and Information Science  
*Chair*

The University of Mississippi invites applicants for the position of Chair of the Department of Computer and Information Science. The Chair will provide leadership and overall strategic direction for the instructional and research programs of the Department. Requirements include a Ph.D. in computer science or a closely related field, evidence of excellence in undergraduate and graduate teaching, demonstrated record of research accomplishments in one or more major areas of computer and information science, and service relevant to the leadership of an academic department. The successful candidate must also display outstanding people skills and be a citizen or permanent resident of the US. The Department has a CSAB-accredited undergraduate program and offers the MS and PhD degrees. The University is located in the historic town of Oxford in the wooded hills of north Mississippi, ninety minutes drive from Memphis. Review of applications will begin immediately and will continue until the position is filled or an adequate applicant pool is reached. Applications, including a description of teaching and research interests, experiences and accomplishments, a complete vita and the names and addresses of four professional references, should be sent to:

Dr. Peter C. Sukanek, Chair  
Computer and Information Science  
Search Committee, 134 Anderson Hall  
The University of Mississippi  
University, MS 38677  
Email: [cmcs@olemiss.edu](mailto:cmcs@olemiss.edu) OR WWW:  
<http://www.cs.olemiss.edu>  
Fax: (662) 915-7023  
AA/ADA/EOE.

### University of Mississippi

Department of Computer and Information Science  
*2002 Faculty Search*

The Department of Computer and Information Science invites applications for several tenure-track positions at the Assistant or Associate Professor level. The rank will depend upon the experience of the individuals. Requirements include a Ph.D. or equivalent in computer science or a closely related field. The applicant must have the ability to teach both undergraduate and graduate students, conduct research in major areas of computer and information science, and supervise M.S. and Ph.D. students. The BSCS program has been accredited by CSAB since 1990. The University is located in the historic town of Oxford in the wooded hills of north Mississippi, an hour drive from Memphis. Oxford has a wonderful small-town atmosphere with affordable housing and excellent schools.

Review of applications will begin immediately and will continue until the position is filled or an adequate applicant pool is reached. The applicant must provide evidence of research potential, effective communication skills, and a broad background in computing. Send a complete vita (including graduate courses and visa/citizenship status) and the names of four references to:

Dr. H. Conrad Cunningham, Chair  
Department of Computer and Information Science  
University of Mississippi, 237 Kinard Hall  
University, MS 38677  
Email: [search@cs.olemiss.edu](mailto:search@cs.olemiss.edu) or  
WWW: <http://www.cs.olemiss.edu>  
Fax: (662) 915-7396

The University of Mississippi is an EEO/AA/Title VI/Title IX/ Section 504/ADA/ADEA employer.

### The University of Missouri-Columbia

Department of Computer Engineering and Computer Science  
*Announcement of Faculty Positions*

The Department of Computer Engineering and Computer Science invites applications for several tenure-track positions. Applicants should have or are about to complete a PhD in Computer Engineering, Computer Science, or a related field. They should show evidence of excellent research and teaching promise. Outstanding senior faculty will also be considered. Successful applicants will be expected to establish a quality research program, to teach both graduate and undergraduate courses, and to participate in student advising. The open positions are primarily focused in:

- Computational Mathematics. Research will emphasize cryptography and associated computational security issues. The applicant will have the opportunity to collaborate with the Department of Mathematics.

- Knowledge based health care. This position is in collaboration with the Department of Health Management and Informatics. Areas of specialization include but are not limited to medical imaging, digital libraries, artificial intelligence, storage and processing of images, social computing.

- Networking. Research will focus on in data communications and networking, including but not limited to wireless, ubiquitous computing, protocols and networking architecture, high performance systems, computer networks performance. Applicants must have an outstanding research and excellent funding record. The department encourages senior level applicants for this position.

- Theoretical Computer Science. The successful candidate will be expected to develop a research program in various areas of computer science, including but not limited to theory of computation, programming languages, compiler design, and applications.

The Department of Computer Engineering & Computer Science has established several outstanding federally and industrially funded research programs in computational intelligence, multimedia processing, telecommunications, decision support, image processing, computer vision, speech understanding, visualization, pattern recognition, databases, digital libraries, networking, computer architecture, parallel processing, robotics, and various IT applications.

Please send a resume, a statement of teaching and research plan, and three references to:

Faculty Search Committee Chair  
Department of Computer Engineering and Computer Science  
201 Engineering Building West  
University of Missouri-Columbia  
Columbia, Missouri 65211-2060  
<http://www.cecs.missouri.edu>

We will start the review of applications immediately, and will continue to consider applicants until positions are filled, subject to availability of funds. Positions are expected to start in August 2002.

The University of Missouri-Columbia is a Doctoral/Research Extensive Institution by the Carnegie Foundation for the Advancement of Teaching. UMC is an Affirmative Action and Equal Opportunity employer. To request ADA accommodations, please contact our ADA Coordinator at (573) 884-7278 (V-TTY).

### University of Nebraska - Lincoln

Computer Science and Engineering Department

The UNL CSE Department is embarking on dynamic growth and seeks applications for endowed professorships, tenure-track faculty positions, and research faculty positions in the following areas:

Bioinformatics, Computational sciences, Computer engineering, Database and information systems, Distributed systems, Networks, Software engineering, or Computer science and engineering education.

Exceptional candidates in other areas will be considered.

UNL is a comprehensive research university with Carnegie I standing and membership in the elite Association of American Universities. The CSE Department offers BS, MS, and PhD degree programs in both computer science and computer engineering. Lincoln, the capital of Nebraska, is a prosperous, medium-sized city that ranks high in quality-of-life.

For complete position advertisements, visit <http://cse.unl.edu/search>, email [search@cse.unl.edu](mailto:search@cse.unl.edu), or phone (402) 472-2401.

### University of North Texas

Department of Computer Science  
*Tenured and Tenure Track Faculty*

The Department of Computer Science at the University of North Texas invites applications and nominations for multiple faculty positions at all levels and all areas of Computer Science to start in Fall 2002. The University of North Texas is making substantial commitments to the growth of the Computer Science Department. The CS department is strongly committed to research and teaching excellence, and continued growth and increasing national visibility. In addition, the State of Texas is making available supplemental funds based on research excellence to institutions of higher education in Texas. The University offers nationally competitive salaries and start-up funds.

The CS department offers Bachelor of Arts, Bachelor of Science (accredited by CSAB), Master of Science and Doctor of Philosophy degrees. Typical enrollments include over 800 undergraduate students and over 150 graduate students. Current faculty research areas include Theoretical CS, Networking, Security, Algorithms, Computer Systems, Agent based systems, Databases, Knowledge Bases, Scientific Computing and Computer Aided Geometric Design. Faculty research is supported by local, state and federal agencies as well as private and commercial concerns. More information

(cont'd)

## Professional Opportunities

about the department can be found at <http://www.cs.unt.edu/>

UNT is a 500-acre campus located in Denton, Texas, a city approximately 35 miles north of Dallas. Current enrollments exceed 26,000. The city of Denton and the Dallas Metroplex host a variety of cultural and social events throughout the year. The area also offers numerous employment opportunities to professional spouses.

Applicants for senior positions must demonstrate established research record, funding history and national recognition. Junior positions require an earned doctoral degree in Computer Science or a related field and a potential for research and teaching.

Interested persons should send an application including a detailed curriculum vitae and have at least three letters of reference sent to:

Faculty Search Committee  
Department of Computer Science  
P. O. Box 311366  
Denton, Texas 76203

or electronically to: [faculty\\_search@cs.unt.edu](mailto:faculty_search@cs.unt.edu)

The committee will begin its review of the applications on or about December 1, 2001. However, the committee will accept applications until all positions are filled. Letters nominating likely candidates are also encouraged.

The University of North Texas is an Equal Opportunity/Affirmative Action/ADA employer, committed to diversity in its faculty and educational programs.

### University of Notre Dame

Department of Computer Science and Engineering

The Department of Computer Science and Engineering at the University of Notre Dame (<http://www.cse.nd.edu>) invites applications for tenure-track faculty positions. Ranks and areas of research specialty are open. Qualifications include an earned Ph.D. in computer science, computer engineering, or a related field, evidence of the ability to develop and/or sustain an active research program, and a sincere interest in quality teaching at the undergraduate and graduate levels. Appointments to chaired professorships may be available for exceptionally qualified candidates.

Notre Dame was ranked 19th among doctoral universities by US News and World Report in 2001. The average SAT score for entering students across the University as a whole approaches 1350. Notre Dame's heritage is unique among top-ranked national universities, resulting in a distinctive character of campus life.

Screening of applications will begin on December 1, 2001 and continue until the positions are filled. Applicants should send a cover letter, a curriculum vita, a statement of research interests, a statement of teaching interests, and the names and addresses of at least three references qualified to comment on the applicant's qualifications either to [faculty\\_search@cse.nd.edu](mailto:faculty_search@cse.nd.edu), or to:

Chair, Faculty Search Committee  
Department of Computer Science and Engineering  
384 Fitzpatrick Hall  
University of Notre Dame  
Notre Dame, IN 46556

University of Notre Dame is an Equal Opportunity, Affirmative Action Employer.

### The University of Oklahoma

School of Computer Science

The School of Computer Science at the University of Oklahoma seeks to fill a faculty position. Candidates must have demonstrated expertise in formal methods related to software development, with a special interest in the use of such methods in practice and with significant, related research accomplishments. Research involving polymorphic, statically typed, declarative programming languages is especially welcome. Applicants must hold a doctorate in computer science or a related discipline.

The School of Computer Science offers bachelors, masters and doctoral degrees. About 350 students are enrolled in the undergraduate computer science program, which is CSAB accredited. The School has about 100 graduate students. Faculty research interests include functional programming, database systems, software engineering, fault tolerance and testing, embedded systems, intelligent systems, telecommunication networks, parallel and distributed computing, large scale scientific computing, graph theory and combinatorial optimization, and theoretical computer science. Norman is a community of about 90,000 people in the Oklahoma City metropolitan area, which, taken altogether, has about a million residents. Norman offers award-winning schools, an inexpensive cost of living, and the rich intellectual life of a university town.

Applications with a list of 5 references must be submitted to:

Rex Page, Chair  
Faculty Search Committee  
School of Computer Science  
The University of Oklahoma  
200 Felgar Street, Room 144  
Norman, OK 73019-6151  
Tel: (405) 325-5408  
Fax: (405) 325-4044  
E-mail: [page@ou.edu](mailto:page@ou.edu)

Screening will begin on November 1, 2001. Applications will be accepted until the

position is filled. The University is an equal opportunity/affirmative action employer. Women and minorities are especially encouraged to apply.

### University of Oregon

Computer and Information Science  
Faculty Positions

The Department of Computer and Information Science has multiple tenure-track and tenured faculty positions open for Fall 2002. The department's primary recruiting focus is in the following areas: networking and parallel/distributed systems at both assistant and associate professor levels, programming languages at the assistant professor level, and graphics at the assistant professor level. Outstanding applicants in other areas will also be seriously considered. Applicants must have a Ph.D. in computer science, a demonstrated record of excellence in research, and a strong commitment to teaching.

The CIS department has seventeen research faculty and two instructors and offers B. S., M. S., and Ph.D. degrees. We offer a stimulating and friendly environment for collaborative research both within the department and with other departments on campus. The CIS Department is associated with the Cognitive and Decision Sciences Institute, the Computational Science Institute, the Computational Intelligence Research Laboratory, and the Software Engineering Research Center. More information about the department, its programs, and faculty can be found at <http://www.cs.uoregon.edu>

Mail your request to: University of Oregon, Dept. of Computer and Information Science, Eugene, OR 97403-1202

The University of Oregon is an AAU research university located in Eugene and within an easy drive of both the Pacific Ocean and the snow-capped Cascade Mountains.

Applicants should send their curriculum vitae, the names of at least four references, a statement of research and teaching interests, and selected publications to:

Faculty Search Committee  
Dept. of Computer and Information Science  
University of Oregon  
Eugene, OR 97403-1202  
email: [faculty\\_search@cs.uoregon.edu](mailto:faculty_search@cs.uoregon.edu)

Review of applications will begin in December 2001 and continue until the positions are filled.

The University of Oregon is an Equal Opportunity/Affirmative Action institution committed to cultural diversity and compliance with the Americans with Disabilities Act.

### University of Pennsylvania

Department of Computer and Information Science

Faculty Positions

The University of Pennsylvania invites applicants for tenure-track appointments in both experimental and theoretical computer science to start July 1, 2002. Senior level appointments will also be considered. Faculty duties include undergraduate and graduate level teaching as well as research.

Successful applicants will find Penn to be a stimulating environment conducive to professional growth. Construction is under way on our new \$21 Million Computer Science Building. The Department of Computer and Information Science has embarked on a strategic plan to add a significant number of tenure-track faculty over the next five years. We seek to expand and broaden both the applied and theoretical sides of our research and teaching program, building on existing strengths in algorithms and computational biology, computer graphics and animation, computer vision and robotics, databases, logic and computation, natural language processing, networks and distributed systems, programming languages, and real time systems.

The University of Pennsylvania is an Ivy League University located near the center of Philadelphia, the 5th largest city in the US. Within walking distance of each other are its Schools of Arts and Sciences, Engineering, Medicine, Nursing, Law, Business and Fine Arts. The University campus and its surroundings in Philadelphia benefit from a rich diversity of cultural opportunities as well as attractive urban and suburban residential neighborhoods.

To apply, please complete the form located on the Faculty Recruitment Web Site at: [http://www.cis.upenn.edu/positions/faculty\\_application.html](http://www.cis.upenn.edu/positions/faculty_application.html)

Electronic applications are strongly preferred, but hard-copy applications (including the names of at least four references) may alternatively be sent to:

Chair, Faculty Search Committee  
Department of Computer and Information Science  
School of Engineering and Applied Science  
University of Pennsylvania  
Philadelphia, PA 19104-6389

Applications should be received by January 15, 2002 to be assured full consideration. Applications will be accepted until positions are filled. Questions can be addressed to: [faculty\\_search@central.cis.upenn.edu](mailto:faculty_search@central.cis.upenn.edu)

The University of Pennsylvania is an Equal Opportunity/Affirmative Action Employer. The Penn CIS Faculty is sensitive

to "two-body problems" and would be pleased to assist with opportunities in the Philadelphia region.

### University of Pittsburgh

Department of Computer Science  
4-Assistant Professor and 2-Lecturer positions

The Department of Computer Science at the University of Pittsburgh is initiating a search for four tenure track positions and two non-tenure track positions effective September 2002. We seek to fill the four tenure track positions at the Assistant Professor level, but higher-level appointments are possible for qualified candidates. The non-tenure track positions are at the lecturer level. All applications from experienced scholars with outstanding records of accomplishment and intellectual leadership are encouraged. The University of Pittsburgh is an Affirmative Action, Equal Opportunity Employer. Women and members of minority groups who are under-represented in academia are especially encouraged to apply.

Outstanding candidates are sought in all areas of Computer Science including but not limited to: operating systems, distributed systems, databases, networks, architectures, graphics, and programming languages. Responsibilities include research, supervision of graduate student research (PhD and MS), and graduate and undergraduate teaching. Candidates should have a PhD in Computer Science and demonstrate exceptional research potential and teaching ability.

The Lecturer positions are to be filled by outstanding teachers. Candidates for this position should preferably have a PhD, although applicants with an MS in Computer Science and with other suitable qualifications in advising of students and in curriculum design and management will be considered.

Candidates should send a curriculum vitae, a statement of research and teaching interests, and names and addresses of at least three references to:

Professor Rami Melhem, Chair  
Department of Computer Science  
University of Pittsburgh  
Pittsburgh, PA 15260

Please direct your inquiries to [faculty\\_search@cs.pitt.edu](mailto:faculty_search@cs.pitt.edu). Applications must be received by January 18, 2002 to ensure full consideration.

The Department provides a stimulating environment for research and teaching those results in strong graduate and undergraduate programs. The Department already has strengths in artificial intelligence, programming languages, algorithms/theory, computer architectures, distributed systems, and software systems and engineering. The Computer Engineering program is an established partnership between the Computer Science Department and the Electrical Engineering Department. Departmental resources include extensive computing facilities of over 350 workstations and personal computers with multimedia capabilities and specialized networks and devices. Faculty members also have network access to additional high performance computing platforms provided by the general computing facilities of the University as well as by the Pittsburgh Supercomputer Center (of which the University of Pittsburgh is a founding member). For further information about the Department please see <http://www.cs.pitt.edu>.

### University of Puerto Rico at Mayaguez

Electrical and Computer Engineering Department

College of Engineering

The department of Electrical and Computer Engineering of the University of Puerto Rico at Mayaguez invites applications for three tenure-track positions in Computer Science or Computer Engineering. Appointments will be made by July 1, 2002. The Department plans to increase its overall strength in computing, and has particular interest in attracting faculty in the areas of networks, databases, computer architecture, and distributed systems. But candidates from all areas of computing are encouraged to apply. Applicants must possess a Ph. D. degree in computer science, computer engineering, or related fields, and demonstrate strong potential for excellence in research.

Currently, a significant number of faculty members of the Department of ECE are engaged in research in Computer Science and Computer Engineering areas including image processing, signal processing, parallel and distributed computing, computing systems, communications, net-centric computing, human-computer interaction, and databases. NASA, NSF, and NIH are the main sponsoring agencies for this research.

The department offers an undergraduate degree in Computer Engineering, a Master in Science, and a Master in Engineering degree in Computer Engineering, and a Ph.D. degree in Computing and Information Sciences and Engineering.

The University of Puerto Rico at Mayaguez has approximately 13,500 students. The Department of Electrical and Computer Engineering has 1,640 undergraduate students and 115 graduate (MS and Ph. D.) students.

For further information concerning the ECE department, please visit [www.ece.uprm.edu](http://www.ece.uprm.edu).

Applications, with curriculum vitae, three reference letters and MS and Ph. D. transcripts should be sent to:

Prof. Héctor Monroy, Chairman  
Department of Electrical and Computer Engineering  
University of Puerto Rico-Mayaguez  
P. O. Box 9042  
Mayaguez, Puerto Rico 00681

UPRM is an equal opportunity affirmative action employer.

### University of Redlands

Department of Mathematics and Computer Science

The University of Redlands invites applications for one or two tenure-track positions in Computer Science, specialty and rank open, to begin in fall of 2002. The second position is offered pending administrative approval. Candidates should have a strong interest in teaching a wide variety of undergraduate computer science courses. Responsibilities include teaching six courses per year, directing student research projects, and engaging in scholarly activity.

Requirements include the Ph.D. in computer science or a related field by September 1, 2002, and evidence of excellence in and a commitment to both undergraduate teaching and scholarship in computer science. We seek candidates with interest and demonstrated ability in working with a diverse student population. The University of Redlands, which enrolls 2000 undergraduates, is a selective, private, comprehensive liberal arts university located in Southern California.

To apply, submit a letter of application, a curriculum vitae, graduate transcripts (unofficial OK), a statement of teaching philosophy, and three letters of reference, at least two of which must address teaching, to:

Dr. Janet L. Beery, Chair  
Department of Mathematics and Computer Science  
University of Redlands  
Redlands, CA 92373-0999

Review of applications will begin on Friday, January 18, 2002, and will continue until the position is filled. The University of Redlands is an EEO employer. We especially encourage women and members of other underrepresented groups to apply.

### University of San Francisco

Computer Science Department

Assistant Professor

The Department of Computer Science at the University of San Francisco (USF) invites applications for a full-time tenure-track position at the Assistant Professor level, to begin Fall 2002. Further details on the position are available online at <http://www.cs.usfca.edu/job.html>.

USF is an AAEOE.

### University of Saskatchewan

Department of Computer Science  
Canada Research Chairs/Tenure Track Faculty Positions

The Department is undergoing a significant expansion in its research and teaching activity, due to increased financial support from Government and the University.

Applications are invited for up to 8 tenure-track faculty positions at the Assistant, Associate and Full Professor levels to start July 1, 2002.

We are seeking three senior researchers for nominees as Tier I Canada Research Chairs in areas of Bioinformatics, Networks, and Real-time Systems.

We are also interested in outstanding entry-level candidates from all areas, but especially databases, software engineering, bioinformatics, networks, graphics, hardware, and human-computer interaction. Applicants must have a Ph.D. in computer science or equivalent.

Located in Saskatoon, Canada's best place to raise a family, the University of Saskatchewan is a major Western Canadian university with approximately 18,000 students. Our Department has arguably the best climate in Canada. The friendly and supportive environment, combined with our excellent research reputation, makes the Department an ideal place to develop a successful academic career. Our Department offers graduate programs at the M.Sc. and Ph.D. levels. See [http://www.cs.usask.ca/faculty\\_positions.shtml](http://www.cs.usask.ca/faculty_positions.shtml). Consideration of completed applications will begin immediately and continue until the positions are filled.

Send curriculum vitae and the names and addresses of three references to:  
Professor Jim Greer, Head  
Department of Computer Science  
57 Campus Drive  
University of Saskatchewan  
Saskatoon, SK S7N 5A9 Canada  
[greer@cs.usask.ca](mailto:greer@cs.usask.ca)

Applicants, regardless of their immigration status, can apply. Members of Employment Equity Groups (women, aboriginal people, people with disabilities, and visible minorities) are encouraged to self-identify. Special efforts will be made to assist with locating positions for spouses.

## Professional Opportunities

### The University of South Carolina Department of Computer Science and Engineering *Faculty Positions in Computer Science and Engineering*

Applications are invited for tenure-track positions at all levels. Candidates should have a doctorate in computer science, computer engineering, or a related discipline. Candidates for Assistant Professor positions are expected to have strong research potential as well as an interest in teaching at both the undergraduate and graduate level. Candidates for positions above Assistant Professor must possess an exceptional research record. Candidates from disciplines outside computer science or engineering must show an ability to contribute directly to the research and teaching mission of the Department. New faculty will receive strong support from the Department as they embark on their professional careers.

The Department of Computer Science and Engineering is in the College of Engineering and Information Technology and offers BE, BS, ME, MS, and Ph.D. degrees to about 650 undergraduate majors and 175 graduate students. The University of South Carolina is located in South Carolina's capital and technology center and is the comprehensive graduate institution in the state, with an enrollment of more than 26,000 students. For more information, see [www.cse.sc.edu](http://www.cse.sc.edu).

Applicants should submit a curriculum vitae along with the names and addresses of three references to:

Chair, Faculty Search Committee  
Department of Computer Science and Engineering  
University of South Carolina  
Columbia, SC 29208

Electronic applications should be sent to [search@cse.sc.edu](mailto:search@cse.sc.edu). Applicants will be accepted until positions are filled.

The University of South Carolina is an affirmative action/equal opportunity employer.

### The University of Texas at Austin Department of Computer Sciences *Tenure Track Positions*

The Department of Computer Sciences of the University of Texas at Austin invites applications for tenure-track positions at all levels. Excellent candidates in all areas will be seriously considered. One senior position requires experience in developing and maintaining strong relationships with government agencies and industrial partners.

All tenure-track positions require a Ph.D. or equivalent degree in computer science or a related area at the time of employment. Successful candidates are expected to pursue an active research program, perform both graduate and undergraduate teaching, and supervise graduate students.

The department is ranked among the top ten computer science departments in the country. It has 36 tenure-track faculty members across all areas of computer science. The department participates in the University's Computational and Applied Mathematics interdisciplinary program. Austin, the capital of Texas, is located on the Colorado River, at the edge of the Texas Hill Country, and is famous for its live music and outdoor recreation. Austin is also a center for high-technology industry, including companies such as IBM, Dell, Motorola, Sematech, AMD, MCC, Tivoli, Trilogy, Dejanews, and Origin Systems. For more information please see the department web page: <http://www.cs.utexas.edu/>.

To apply, please send a curriculum vitae, home page URL, description of research interests, and selected publications, and ask three referees to send letters of reference directly to:

Faculty Search Committee  
Computer Science Department  
University of Texas at Austin  
Austin, Texas 78712 USA

Inquiries about your application may be directed to [faculty-search@cs.utexas.edu](mailto:faculty-search@cs.utexas.edu)

Applications will be considered immediately until the positions are filled. To ensure full consideration, please apply by January 15, 2002. Women and minority candidates are especially encouraged to apply. The University of Texas is an Equal Opportunity Employer.

### The University of Texas at Dallas Computer Science Department *Tenure-Track Positions*

The Computer Science Department of The University of Texas at Dallas invites applications for tenure track faculty positions in Computer Science at all levels, starting January or September 2002. Visiting positions may also be available.

Candidates for tenure-track positions must have a Ph.D. degree in Computer Science, Software Engineering, Computer Engineering or equivalent. Candidates for junior positions should show strong potential for excellent teaching and research; candidates for senior positions should have a strong record of research, teaching, and external funding. Candidates in all areas of Computer Science, including algorithms, networking, graphics, architecture, bioinformatics, distributed systems, embedded systems, software engineering, and multimedia, will be considered.

The Department of Computer Science offers the Ph.D. degree in Computer Science

and has Master's degrees in Computer Science with major in Software Engineering as well as tracks in Telecommunications, and Traditional Computer Science. At the undergraduate level, the Computer Science Department is the first in the state of Texas to offer a Bachelor of Science degree in Software Engineering. In Fall 2002, the Department of Computer Science will move into a new 250,000 sq. ft. building. We have experienced very rapid growth in recent years and the potential for future growth is excellent. Currently the Computer Science Department has a total of 34 faculty and 13 senior lecturers.

The University is located in the most attractive suburbs of the Dallas metropolitan area. There are over 600 high-tech companies within 10 miles of the campus, including Texas Instruments, Nortel Networks, Alcatel, Ericsson, Hewlett-Packard, Nokia, Fujitsu, MCI, EDS, and Perot Systems. Almost all the country's leading telecommunication's companies have major research and development facilities in our neighborhood. Opportunities for joint university-industry research projects and consulting are excellent.

In addition to individual faculty workstations, the department has twelve computer/research laboratories equipped with around 200 high performance workstations and high-end PCs. The Academic Computer Center supports both UNIX based workstations and PCs as well as high-speed dial-in access to campus computing facilities. For more information, contact Dr. D.T. Huynh, Department Head, at 972-883-2169 or 972-883-2808; send e-mail to [huynh@utdallas.edu](mailto:huynh@utdallas.edu), or view the Internet Web page at <http://www.cs.utdallas.edu/dept/cs/>. The search committee will begin evaluating applications on December 1, 2001, and will continue until the positions are filled.

Applicants should mail their résumé with a list of at least five academic or professional references as soon as possible to:

Academic Search #748  
The University of Texas at Dallas  
P. O. Box 830688, M/S AD 23  
Richardson, TX 75083-0688

The University of Texas at Dallas is an Equal Opportunity/Affirmative Action employer and strongly encourages applications from candidates who would enhance the diversity of the University's faculty and administration.

### University of Waterloo

Department of Computer Science  
*Faculty Positions*

The University of Waterloo invites applications for several tenure-track faculty positions in Computer Science. The Department prides itself on being a leader in Computer Science education. Our Computer Science department houses a diverse research program with international stature. Because of its recognized capabilities, the Department attracts exceptionally well-qualified students at both undergraduate and graduate levels. Waterloo pioneered the co-operative education system in Canada and now has the largest co-operative education program in North America.

The University of Waterloo's Computer Science Department is one of the largest and the most eclectic department within Canada. Over twenty new faculty members have joined the Department recently, resulting in nearly 60 full-time faculty members. The Department enjoys an excellent reputation in pure and applied research and is supported by 14 departmental research laboratories. The University has an enlightened intellectual property policy in which the rights are vested in the inventor; in part, this policy is responsible for many spin-off companies such as Waterloo Maple and Open Text Corp. For further information about the Department, please see <http://www.cs.uwaterloo.ca/index.html>

Exceptional candidates at all levels of experience and in our priority recruiting areas: bioinformatics, distributed systems, graphics, networks, scientific computation, software engineering, and user interfaces are encouraged to apply. Successful applicants are expected to develop and maintain a productive program of research, to attract and develop highly qualified graduate students, to provide a stimulating learning environment for undergraduate and graduate students, and to contribute to the administration of the Department. A Ph.D. in Computer Science or equivalent is required, with evidence of excellence in teaching and research. Rank and salary will be commensurate with experience.

Applications should include a curriculum vitae and the names and e-mail addresses of three references. The application should be directed to:

Chair, Department of Computer Science  
University of Waterloo  
Waterloo, Ontario, Canada N2L 3G1  
email-cs-chair@cs.uwaterloo.ca

To expedite handling of applications, candidates should ask those named as references to direct supporting letters to the same address. The positions are expected to commence during the 2002 calendar year. Applications will be considered as soon as they are complete and as long as positions remain available.

The University of Waterloo encourages applications from all qualified individuals, including women, members of visible minorities, native peoples, and persons with

disabilities. Canadian Citizens and Permanent Residents will be considered first for these positions.

These appointments are subject to the availability of funds.

### University of Wisconsin-Madison Computer Sciences Department *Faculty Positions*

The Computer Sciences Department at the University of Wisconsin-Madison, consistently ranked among the top ten departments in the nation, has embarked on a multi-year effort to significantly enhance the strengths of the department. As a part of this endeavor, we hired nine new faculty over the last three years, and have multiple faculty positions available beginning August 2002.

We invite applications from outstanding candidates in all areas of Computer Science. Applications from candidates in the areas of artificial intelligence, computer architecture, computer graphics, databases, and networking are especially encouraged. Applicants should have a Ph.D. in Computer Science or in a closely related field with demonstrated strength in scholarly research. The positions are at the Assistant Professor level, but exceptional candidates at the Associate Professor level (tenured) will also be considered. Successful candidates will be expected to teach at the undergraduate and graduate level, in addition to establishing a strong and highly visible research program.

Further information about the department may be found at <http://www.cs.wisc.edu/>.

Applicants should submit a curriculum vitae, statement of research objectives, sample publications, and arrange for at least three letters of reference to be sent directly to:

Chair, Faculty Recruiting Committee  
Computer Sciences Department  
University of Wisconsin-Madison  
1210 West Dayton St.  
Madison, WI 53706

Applicants are encouraged to submit their applications as soon as possible, but no later than February 15, 2002.

The University is an Equal Opportunity/Affirmative Action employer and encourages women and minorities to apply. Unless confidentiality is requested in writing, information regarding the applicants must be released on request. Finalists cannot be guaranteed confidentiality.

### University of Wisconsin-Milwaukee

Computer Science  
*Tenure-Track Faculty Positions*

The Computer Science Program at the University of Wisconsin-Milwaukee is seeking qualified candidates to fill several tenure-track faculty positions. We invite applications from strong candidates at all levels and in all areas of Computer Science, subject to the needs of the Department. All candidates for faculty positions should have a demonstrated promise in research and teaching in Computer Science. Senior candidates should have excellent research records.

The Computer Science Program at UWM is poised for continued development. Our Program has an excellent record in hiring outstanding junior faculty and in helping them develop their careers. Several of the eligible faculty in our Program have received the NSF Early CAREER Award. Program faculty are engaged in research projects that span many areas including Artificial Intelligence, Computational Geometry, Computer Graphics, Cryptography and Data Security, Distributed Systems, and Programming Languages and Software Systems. Many of the projects include collaborative work with researchers from other academic units, institutions and industrial organizations.

Our University, the home of about 24,000 students, is located in a very pleasant residential neighborhood near the shores of Lake Michigan. Our location in a major metropolitan area helps facilitate easy interactions with industry and affords many cultural and recreational activities.

Applicants should send a hard copy vita by post or fax, and we also request at least three letters of reference be sent to:

Faculty Recruitment Coordinator for  
Computer Science  
Department of Electrical Engineering and  
Computer Science  
University of Wisconsin-Milwaukee  
P.O. Box 784  
Milwaukee, WI 53201-0784  
E-mail: [recruit@cs.uwm.edu](mailto:recruit@cs.uwm.edu)  
Fax: 414-229-6958

Evaluation of all candidates will begin Fall of 2001 and will continue until the positions are filled. Female and minority candidates are strongly encouraged to apply. Faculty applications must be accompanied by a statement of plans for research and teaching. Please visit our website at <http://www.cs.uwm.edu> for periodic updates on the status of our recruitment.

UWM IS AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY INSTITUTION COMMITTED TO DIVERSITY.

### Veritas DGC

Houston Processing Center-Houston, TX  
*Cluster Programmers*

Our seismic processing operations image subsurface structures by using tremendous computing power, which include hundreds of PC clusters. We are looking for candidates with experience in cluster programming and system support.

Position Requirements include: BS or higher in Computer Science, Electrical Engineering, or related technical degree. Recent experience with Parallel and Distributed Computing. Experience in parallel programming Familiarity with MPI, PVM. Programming experience with Fortran, C, C++ and JAVA. Knowledge of Geophysics or Geophysical Data Processing is a plus, but not required.

Qualified Candidates should submit resume to: [Jennifer\\_smith@veritasdgc.com](mailto:Jennifer_smith@veritasdgc.com) by fax to 832-351-8770, or by mail to Veritas DGC  
GeoServices HR  
10300 Town Park  
Houston, TX 77072

Visit our website at [www.veritasdgc.com](http://www.veritasdgc.com). We are an Equal Opportunity Employer.

### Virginia Tech

Department of Computer Science  
*Virginia Bioinformatics Institute*

The Department of Computer Science and the Virginia Bioinformatics Institute (VBI) seek applications for tenure-track positions in the Department of Computer Science from individuals desiring to make fundamental contributions to both computer science and the life sciences in bioinformatics. Special funding from the Commonwealth of Virginia provides competitive salaries and startup funding for five faculty positions over the next three years. Three positions are currently open: one at the Professor rank and two at the Associate/Assistant rank.

Applicants for the senior position must have a significant track record of grant funding. All applicants must have a demonstrated record of publications in computer science or computational science, and a commitment to addressing significant life science problems. A demonstrated record of accomplishments in bioinformatics is preferred. Ability to collaborate with other computer scientists, researchers in VBI, and faculty in the life sciences is required. Successful applicants will be expected to secure significant external funding, conduct a highly productive research program, attract and advise doctoral students in computer science, and help develop interdisciplinary graduate programs in bioinformatics.

The university has a strong commitment to bioinformatics. The Virginia Bioinformatics Institute currently employs over 25 faculty and staff, and is projected to grow to 75 faculty and staff in the next year and to a level of \$13 million in annual state funding by 2004. VBI already has attracted over \$10 million in external funding in its first year. The Department of Computer Science has an outstanding record of multidisciplinary research, and has projects in human-computer interaction, high performance computing, problem solving environments, digital libraries, and bioinformatics. Additional information on the positions and the department is available at <http://www.cs.vt.edu>. Additional information about VBI is at <http://www.vbi.vt.edu>.

Virginia Tech is located in Blacksburg, a scenic, lively, All-American Award winning town in southwest Virginia with affordable housing. Nearby is the white water of the New River and 1.7 million mountainous acres of national forest.

Applicants should send a curriculum vitae, a 1-2 page statement of research goals in both computer science and life science, and at least three letters of reference to:

Bioinformatics Faculty Search  
Dept. of Computer Science, 660 McBryde Hall (0106)  
Virginia Tech  
Blacksburg, VA 24061

Review of candidates will begin October 15, 2001, and continue until the positions are filled. The College of Arts and Sciences is deeply committed to recruiting, selecting, promoting, and retaining women, persons of color, and persons with disabilities. We strongly value diversity in the college community, and seek to assure equality in education and employment. Individuals with disabilities desiring accommodations in the application process should notify Dr. Dennis Kafura, 540/231-6931, TTY: 800/828-1120.

### Wake Forest University

Computer Science  
*Endowed Chair in Computational Biophysics*

Wake Forest University invites applications for an endowed chair with the title of Reynolds Professor of Physics and Computer Science. Wake Forest is a highly ranked, private university with about 3800 undergraduates, 600 graduate students, and 1,500 students in the professional schools of medicine, law, and business. The Physics Department has a significant focus in biophysics and is recruiting for an Assistant Professor in Computational Biophysics in addition to this joint position with Computer Science. A significant number

(cont'd)

## Professional Opportunities

of the Faculty in Computer Science focus their research on Scientific Computing, with applications in astrophysics, biophysics, and biomedical imaging.

The successful candidate will have received international recognition of excellence in the area of computational biophysics, preferably in functional genomics. The candidate should also have demonstrated excellence in the teaching of courses relating to topics in physics, biophysics, and computer science at the undergraduate and graduate levels. Continued excellence in research, teaching, and obtaining external funding will be expected. Collaboration with researchers in other Departments such as Chemistry, Biology, Mathematics, and the WFU Medical School will be encouraged. Applicants should send a copy of their CV and statements regarding their research interests and teaching philosophy to:

The Reynolds Professor Search Committee  
Box 7507, Wake Forest University  
Winston-Salem, NC 27109-7507  
Applications are due January 5, 2002.

More information is available at  
<http://www.wfu.edu/csphy/recruiting>.

Wake Forest University is an equal opportunity/affirmative action employer.

### Washington University in Saint Louis

Department of Computer Science  
Faculty Positions Available  
[www.cs.wustl.edu](http://www.cs.wustl.edu)

Applications are invited for tenure-track faculty positions at the Assistant, Associate and Full Professor levels. Applicants should hold a doctorate in Computer Science or a closely related field, have a record of accomplishment in research, and demonstrate a strong commitment to teaching.

Building upon the impressive recruiting successes of the last three years that included ten new tenure-track faculty, the Department plans to fill several additional faculty positions. The Department continues to seek outstanding candidates likely to develop synergistic relationships with existing areas of research excellence. Academic couples seeking to co-locate are strongly encouraged to apply. Research groups in search of a highly supportive institutional environment may also want to consider relocating to Washington University. With the strong backing of the University and the School of Engineering and Applied Science, the Department is committed to making significant investments in promising new areas of study and to providing the kind of resources and environment that will enable new faculty members to flourish intellectually. Candidates with a strong background in networking (including wireless communication and security), software systems (particularly embedded systems, mobile computing and database), computer engineering, theory, multimedia communications, human interfaces, and computational science will receive special consideration.

The Department enjoys a great research reputation and impressive levels of research activity, e.g., annual research expenditures recently reached a record high of \$450,000 per faculty member. Research areas which are well represented in the Department include: networking and communications; distributed software systems; graphics and computer vision; artificial intelligence; computer and system architecture; and computational biology. Our doctoral graduates have been heading for successful careers in academia and industrial research centers while noteworthy entrepreneurial endeavors spearheaded by our faculty and graduates (with the full support of the University) attest to a highly respected technology transfer tradition and culture. Strict limits on University undergraduate enrollments combined with the increasing popularity of Washington University allows the Department to continue to offer small classes and close personal attention to a diverse student body of exceptional quality and to benefit from strong participation by undergraduates on a wide range of research projects. A faculty known for its friendly, accepting and supportive nature provides a welcoming and mentoring environment for new arrivals. Finally, progressive fiscal policies that reward research, teaching, and innovation by the Department have created an environment rich in resources that fosters a readiness to invest in promising new initiatives.

Washington University is a leading private national university recognized for its world class intellectual contributions (20 Nobel Prize Laureates have been associated with the University), its exceptional resources (an endowment among the largest in the nation), its ambitious investments in physical facilities, and its commitment to research excellence. The University is located in the midst of a delightful residential community that places much value on education and culture and is very popular with both faculty and students.

Qualified applicants should submit a complete application (cover letter, curriculum vita, research statement, teaching statement, and three letters of reference). Electronic submissions ([recruiting@cs.wustl.edu](mailto:recruiting@cs.wustl.edu)) are preferred. All other communications should be directed to:

Dr. Catalin Roman, Chairman  
Department of Computer Science  
Campus Box 1045, Washington University  
One Brookings Drive  
St. Louis, MO 63130-4899.

Applications will be considered as they are received. Those arriving after February 1, 2002, may not be given full consideration. Washington University is an equal opportunity/affirmative action employer.

### Wayne State University

Department of Computer Science

#### Faculty Positions

The Department of Computer Science of Wayne State University invites applications for several tenure-track faculty positions at all levels to start in January 2002 or August 2002. All areas of computer science will be considered.

Candidates should have a Ph.D. in computer science, engineering or a closely related field, a strong interest in and commitment to both research and teaching, a publication record in their area and show potential for obtaining external research funding. Applicants for a senior position should demonstrate a strong record of external funding and significant impact in their field.

Wayne State University, located in Detroit's Cultural Center, is a comprehensive (Carnegie I) urban research university serving 33,000 students. The University has made a strong commitment to information technology and academic computing.

The Department of Computer Science offers B.S., M.S. and Ph.D. degrees. Federal agencies as well as industries support a variety of research programs within the Department. The Department maintains active collaborative relationships with the Institute for Scientific Computing, Institute for Manufacturing Research, Smart Sensor Program, Life Science Corridor initiative and many other centers and departments within the university, which provide research opportunities in computer science.

Applicants should send a letter of intent, a statement of research and teaching interests, a resume and the names of at least three references including the reference's address, email, telephone and fax number. Please send this information to:

Dr. Farshad Fotouhi, Chair  
Faculty Search Committee  
Wayne State University  
Department of Computer Science  
5143 Cass Avenue, Room 431 State Hall  
Detroit, MI 48202  
313-577-3107 (voice)  
313-577-6868 (fax)  
[fotouhi@cs.wayne.edu](mailto:fotouhi@cs.wayne.edu)

Applications will be accepted until the positions are filled.

Wayne State University is an equal opportunity/affirmative action employer. Wayne State University - People working together to provide quality service. All buildings, structures and vehicles at WSU are smoke-free.

### Wesleyan University

Department of Mathematics and Computer Science

The Department of Mathematics and Computer Science at Wesleyan University is seeking to fill a tenure-track computer science position at the Assistant Professor level starting in the fall term of 2002. Candidates for the position should have a Ph.D., or be near completion of a Ph.D., in Computer Science or a related area.

The Department (<http://www.math-cs.wesleyan.edu>) currently has four full-time computer scientists with research interests in algorithms, bioinformatics, programming languages, and computational logic. There is excellent interaction with mathematicians in the department in the fields of combinatorics and logic and with faculty in the sciences through an inter-disciplinary initiative in integrative genomic sciences. The Department has undergraduate degree programs in both mathematics and computer science as well as an active Ph.D. program. The teaching load in Computer Science is three courses per academic year.

Outstanding candidates in any area of computer science are encouraged to apply. We are looking for candidates, with excellent research records and a strong commitment to undergraduate and graduate instruction, who are prepared to contribute to the standard undergraduate curriculum in computer science and to play an active role in the graduate program.

Wesleyan University is a highly selective university that offers a unique combination of liberal-arts college spirit in the classroom and a university research environment, with an unusually strong commitment to research for a school of its size. The student body is made up of approximately 2,900 full-time undergraduates and graduate students in 41 departments and programs.

The University places a high priority on diversity in the faculty and administrative staff, in the student body, and in the curriculum. We especially encourage women and minorities to apply for the position.

Inquiries about the position may be sent to [csjob@wesleyan.edu](mailto:csjob@wesleyan.edu). Consideration of applications will begin January 1, 2002 and will continue until the position is filled. Applicants

should arrange to have at least three letters of recommendation, including one letter which evaluates teaching qualifications, sent directly to the following address:

Computer Science Search Committee  
Department of Mathematics & Computer Science  
Wesleyan University  
Middletown, CT 06459-0128

### Worcester Polytechnic Institute

Computer Science Department

#### Tenure-Track Faculty

Do you want the combination of a research university teaching load with a liberal-arts college environment? Do you like engaging undergraduates together with graduates in long-term, open-ended projects? Would you enjoy doing interdisciplinary research, experiencing the interplay between technology and society, and helping students apply their technical skills in global settings? If so, you should consider joining the faculty at WPI.

WPI's acclaimed and long-standing project-based undergraduate curriculum and a significant graduate program offer its faculty a unique balance between research and teaching. The department of computer science expects to hire several tenure-track faculty to start in January or August 2002. Candidates should have a Ph.D. in Computer Science or a closely related field, and the potential for excellence in research and teaching.

Two of the positions are targeted for applicants in the areas of Software Engineering, Databases and computer graphics/vision; the other positions are open to excellent candidates in all areas. We will consider applicants at any rank for all positions.

The department currently has 16 tenure-track faculty and enjoys an exceptionally close-knit, collegial atmosphere. The department grants B.S., M.S. and Ph.D. degrees in Computer Science, and has a Computer and Communications Networks graduate program, jointly with the Electrical and Computer Engineering department. Faculty research is funded by both federal agencies (such as NSF and DARPA) and industrial collaborators. We plan a large increase in faculty size over the coming years. The department currently is the largest at WPI in terms of student body, with more than 500 majors and over 100 full-time M.S. and Ph.D. students.

WPI, the nation's third oldest college of engineering and science, has approximately 2,700 undergraduates and over 1,000 full- and part-time graduate students, with over 220 tenure track faculty.

For further information about the university see the WPI and the Computer Science Department web-sites ([www.wpi.edu](http://www.wpi.edu) and [www.cs.wpi.edu](http://www.cs.wpi.edu)). The WPI campus is situated in the heart of Worcester, close to the city's major cultural attractions, including the American Antiquarian Society, the Worcester Art Museum and several major music performance venues.

Worcester, the third-largest city in New England, is forty miles west of Boston. The city offers access to the diverse cultural and recreational resources of a major city. Worcester is also the seat of nine other colleges and universities, including the Medical School of the University of Massachusetts. WPI is close to numerous high-tech companies (in town and along the I-495 and Rt. 128 corridors); it is three miles from a thriving biotechnology industrial park and offers ample opportunities for industrial interaction.

To apply, submit a letter of application, resume and the names, postal addresses and e-mail addresses of at least three references to:

Recruiting Committee  
Computer Science Department  
WPI, 100 Institute Road  
Worcester, MA 01609-2280

Questions about the hiring process, as well as electronic applications should be addressed to [recruit@cs.wpi.edu](mailto:recruit@cs.wpi.edu). For full consideration, applications for positions beginning in January 2002 should be received by 10/15, and for August 2002 positions, by 01/15/2002.

### Yale University

Computer Science Department

#### Junior Faculty Positions

The Yale Computer Science Department is looking for highly qualified candidates for junior faculty positions beginning in the 2002-2003 academic year. We seek to expand and broaden both the applied and theoretical sides of our research and teaching program, building on existing strengths in algorithms and complexity theory, artificial intelligence, computational science and applied mathematics, distributed computing, machine learning, programming languages and compilers, security and cryptography, and vision and robotics. Strong candidates in all areas will be considered; high-priority areas include computational biology, bio-informatics, electronic commerce and market-based computation, databases, graphics and multimedia, and networking.

Applicants are expected to excel in both research and teaching. They will find many opportunities for research collaborations both inside and outside the Computer Science department. Interdisciplinary work is encouraged, with Yale's world-class faculty in such computationally active fields as biology, chemistry, economics, engineering, geophysics,

management, mathematics, medicine, psychology, physics, and statistics. Yale faculty regularly have the opportunity to teach excellent students, both graduate and undergraduate, in relatively small classes.

Candidates should hold a Ph.D. in computer science or related discipline. Applications submitted by January 1, 2002 will be given highest priority. Qualified women and minority candidates are encouraged to apply. Yale is an affirmative action/equal opportunity employer. Our home page may be found at [www.cs.yale.edu](http://www.cs.yale.edu).

Send vitae and have at least three letters of reference sent to:

Faculty Recruiting Committee  
Department of Computer Science  
Yale University  
P. O. Box 208285  
New Haven, CT 06520-8285

### Workshops from Page 11

second and final workshop for undergraduate teachers of computing-related disciplines. The workshop will examine ways to use history to improve undergraduate teaching. The speakers and topics will have little overlap with those from the first workshop, which was held at Amherst College in August 2001. Thus, people who attended the first workshop, as well as newcomers, are welcome and should find material of interest. Although exact dates have not been set, the workshop will most likely be held in Minneapolis in late April 2002.

In a fast-moving, forward-looking field such as computer science (or other computing-related disciplines) where curricular concerns are often focused on cramming in as much technical information as possible, the addition of modest amounts of history into the established curriculum can have highly salutary effects.

The purpose of this workshop is to offer teachers practical advice about how to use history to enhance their current instructional practices. This workshop will likely include a tour of the Charles Babbage Institute for the History of Information Processing and practicums to get advice about using historical materials in your own courses, as well as some lectures by leading historians.

No registration fee will be charged. Approximately 20 scholarships, covering hotel and meal costs (but not travel) will be available. (Faculty not receiving a scholarship will be welcome, but must pay for their own housing and meals.) Faculty who are interested in attending should send an e-mail of interest to William Aspray <[aspray@cra.org](mailto:aspray@cra.org)>. Details about dates, location, speakers, and financial support will be placed on the CRA website [www.cra.org](http://www.cra.org) and emailed to those who have expressed an interest as soon as the information is available. ■

### CRA Welcomes New Academic Members:

Colorado School of Mines (MCS)  
Illinois State University (ACS)  
Loyola University Chicago (CS)  
Southern Illinois University,  
Carbondale (CS)  
Southern Polytechnic State  
University (CSE)  
State University of New York,  
Binghamton (CS)  
University of Maine (CS)  
University of Notre Dame (CSE)  
Wayne State University (ECE)

## Special Insert

### Computing Research Association

## Best Practices Memo

# Commercialization Oversight for Computer Research Departments

### Summary

The relentless pressure to innovate in the information technology (IT) industry has drawn university researchers and graduate students into entrepreneurial situations to an increasing degree. The trend affects the academic enterprise in diverse ways, both favorable and unfavorable. The risks and rewards are outlined, and the concept of a Commercialization Oversight Committee is described as a mechanism that can facilitate the best outcomes when interests conflict.

### Background

The dramatic proliferation of information technologies and the rapid rate at which IT research is being commercialized have recently put pressures on computer science and allied departments, as their faculties and graduate students ponder the opportunities presented by entrepreneurship. Commercialization is an outcome of research that society values and is one of the justifications for research funding; hence, it is important to facilitate it. But it is clear that the traditional standards of collegiality, scholarly respect, and peer governance that are typical of academic departments can be jeopardized by commercialization opportunities.

The problem is not new. Commercialization opportunities have been available since the invention of ENIAC. And, as observed in the ENIAC experience, commercial potential can engender conflicts and disputes. The current problem, however, differs in magnitude and appears to have been precipitated by two recent departures from past experience. First, the scale and speed of the startup opportunities seem to be greater than in the past. These changes seem to be propelled by the recent business concepts of “time to market” and “winner take all” that are critical to IT commercialization.

Second, federal legislation, known as the Bayh-Dole Act, requires universities to assess the commercialization potential of any intellectual property (IP) created with federal funding. Obligated by statute to set up technology transfer offices and motivated by the possibility of helping the institution in the event of a commercialization success, universities, like faculty and students, are torn between the altruism of a scholarly paradise and the essentials of a business incubator.

Some issues to be considered include:

- Should a faculty member starting a company take a leave of absence, or is starting a company compatible with a full-time faculty position? How long can a leave be? How often can a leave be taken?
- Can a graduate student work for a company founded by a faculty member and also be advised by that person? Who decides what is best for the student’s academic career vs. what is best for the university?
- If a company is started, will everyone who participated in the ideas at the university feel that they have received a fair reward for their contributions?
- If a project at the university is related to the company, how does information flow between the two?
- Will the number or content of publications or the distribution of software be restricted to preserve commercial advantage?

Some of these issues should be discussed within the department and guidelines should be established for faculty. Other issues are complex and situation-specific, eliminating any possibility of simple or universal solutions.

One component of a solution that can address a few critical aspects of commercialization and is widely applicable is the concept of a departmental Commercialization Oversight (CO) Committee. This memo describes the CO concept and a typical charter.

### Principles of Commercialization Oversight

A commercialization oversight activity is founded on two basic principles. Although these principles have been adopted at a number of universities, they are perhaps articulated best in the University of California’s documentation.

1. *Primacy of the University.* The University of California states this principle clearly in its *Guidelines on University-Industry Relations*: “First consideration must be given to the University’s mission of teaching, research and public service. In pursuing relationships with industry, the University must keep the public trust and maintain institutional independence and integrity to permit faculty and students to pursue learning and research freely.”

2. *Responsible Behavior.* The academic participants in a commercialization activity are typically the creators of the IP, the faculty and graduate student *inventors*, and the administrators of the institution, the *university*. They are governed by guidelines, policies, and laws designed to circumscribe and define acceptable behavior. The burden of acting legally, ethically, and responsibly relative to these constraints falls to the inventors and the university. Integrity is essential to the process if the institution is to preserve academic freedom. As the University of California’s *Statement On Conflicts of Interest* points out, “A codification of the complex ethical questions involved, even if possible, would be unduly restrictive.”

In addition to these two principles, the commercial oversight concept is founded on the premise that it is an internal—that is, a departmental—responsibility. The inventors are members of the department, and any ill effects of commercialization will have an impact on the students and faculty. Further, situations in which a graduate student is exploited or a faculty member carries the load for a moonlighting colleague are evident at the departmental level. They are invisible at the school, college, or university levels. So oversight is a departmental responsibility.

### Role of Commercialization Oversight

From the two principles outlined above, it is evident that the role of the CO Committee is not to enforce regulations, but to facilitate high standards in order to preserve collegiality. Although there are many ways to do this, the CO activity will likely fulfill four basic functions:

1. Serving as a focal point for commercialization information.
2. Vigilance on behalf of the student-faculty relationship.
3. Vigilance on behalf of the faculty-faculty relationship.
4. Periodic review of commercialization activity.

These functions can be fulfilled by groups of one to several people, but a committee of two neutral senior faculty offers the advantage of providing multiple points of view and, possibly, some wisdom. In this case, ‘neutral’ means that the faculty are not themselves involved in commercialization activities that would be of concern to the committee. (Consulting is not typically an issue for this committee.) It is appropriate, and possibly advantageous, if the members have had previous commercialization experience. The goal is to ensure independent judgment, both in appearance and in fact.

**Focal Point.** It is likely that many faculty members proceed through their careers, oblivious to university policies on commercialization and unaware of their obligations under federal laws such as the Bayh-Dole Act. Graduate students are even less well informed. Then one day they realize their research efforts have produced IP of commercial value. The CO Committee can serve as a neutral source of information or, more typically, can direct inventors to campus resources related to technology transfer.

The existence of the CO Committee is perhaps most critical to graduate students whose closest academic confidant may be their advisor, a person who will have a conflict of interest if the IP has been developed jointly. (See Vigilance.) By making the committee visible within the unit and emphasizing its role as an unbiased facilitator, students can be confident of receiving independent and unbiased advice about commercialization. Note that the student doesn’t have to have commercial interests to meet with the committee. A student whose advisor is too busy with a commercialization activity to fulfill his or her role as advisor might seek input from the committee as well.

Another focal-point aspect of the CO Committee, especially if it maintains some continuity from year to year, is its role as the repository of corporate knowledge regarding past commercialization activities. Although commercialization situations are generally very different from one another—which is why the process cannot be so easily codified—experience always teaches lessons. Mistakes should not be repeated, and successes should be.

**Vigilance on Behalf of the Student-Faculty Relationship.** There are several aspects of the student-faculty relationship<sup>1</sup> with which the CO Committee should be concerned:

1. The advisor/advisee role.
2. The faculty/student economic standing.
3. The faculty/student job performance.

*Advisor/Advisee.* Although faculty and graduate students may be equals in the creation of IP and in their roles as “economic individuals,” they are not equals in their academic relationships. The graduate student is typically subordinate in the following contexts:

- As a research assistant on a grant, which is likely the source of the student’s livelihood.
- As a thesis student, who needs the approval and signature of the faculty advisor to receive his or her degree.
- As a candidate for employment, grants, awards, etc., after graduation when the advisor may be asked to provide letters of recommendation.

In addition, the faculty member may have considerable stature and influence in the scholarly community into which the student is likely to enter,

## Special Insert

which constitutes additional, if less direct, authority over the student's future.

The existence of the above relationships affects other faculty-graduate student interactions that, under different circumstances, would be equalized. For example, suppose a faculty advisor starts a company and later asks a graduate student to work for the company, perhaps for the summer or on a consulting basis. The student's willingness to agree or to accept the proffered terms of employment may be tempered by the knowledge that the advisor could exploit his or her advantage in the academic relationships.

The CO Committee must advise faculty to avoid such situations. (In the cited example, the faculty member should delegate the negotiations to another principal of the company, or to an intermediary.) Students should be notified that faculty have been so advised, and that they should not enter into such situations. Although this protocol does not fully equalize the negotiation, it strengthens the student's position. Since eliminating such contact is impossible because of the strong economic incentives, both sides may have to cooperate, perhaps making the "intermediary" solution the best that can be achieved.

This crucial role of alerting all participants to the potential risks of the type just outlined is obviously most successful when accomplished early in the commercialization activity.

*Economic Standing.* Because the Bayh-Dole Act requires institutions that receive grants to pursue commercialization where appropriate, the investigators must disclose IP to the university if it was developed with federal funding. After evaluating the IP, if the university decides it has commercial potential it will proceed to secure its commercial interest (a patent, for example) and seek companies to license the IP. It is at this point that a faculty member might found a company to license the IP from the university.

Because the faculty-student relationship is often collaborative—while conducting research or writing papers, for example—it is possible for both students and faculty to misunderstand the change in their relationship, relative to the formation of a company. For example, students often assume that, if a faculty member founds a company based on IP to which they have both substantially contributed, they will also both be founders.

But the decision to found a company is an economic decision open to both the faculty member and the student equally, and others for that matter. Whether a faculty-initiated company includes the student as a founder, or vice versa, is a business decision. If the inventors receive a portion of the revenue derived by the university from the license, as is typical in most universities, then they will both share in the rewards of their IP despite the business activity of others.<sup>2</sup>

*Job Performance.* Faculty members or graduate students involved in a commercialization activity may neglect their academic responsibilities.

When a faculty member is distracted by commercialization activity to the detriment of graduate-student advising (typically advising students not involved in the commercialization), the CO Committee may receive complaints. But the committee should be alert to this possibility and inquire—some students may be reticent to complain, fearing retaliation from the advisor. One obvious remedy is for the student to switch advisors, but this is often not easy for students who are heavily invested in a particular research topic. And advisors may not be eager to lose the student despite the problems. It is a delicate situation where the CO Committee may have to play the role of mediator.

The case of a graduate student, but not the advisor, being distracted by involvement in commercialization usually takes care of itself. The advisor keeps after the student to make progress. However, before an advisor issues a "progress or leave" ultimatum, options such as a leave of absence should be considered. If graduate students are tempted to quit school and join the business, they should be counseled to consider the long-term career implications of that decision.

Graduate students whose dissertation research becomes the intellectual property of a commercialization effort should establish during negotiations that they retain unencumbered publication rights to their dissertation, and/or any related research papers that can help launch their career.

**Vigilance on Behalf of the Faculty/Faculty Relationship.** Faculties de-emphasize power relationships among their members to promote the vitality of intellectual interactions and the free flow of ideas. The term "collegiality" derives from this tradition. The ideal is worth preserving, but commercialization introduces two challenges to collegiality:

1. Conflicts of interest connected with the Promotion and Tenure process.
2. Workload distribution.

The CO Committee should be alert to both challenges.

*Promotion and Tenure.* Though de-emphasized, there is still a significant power differential within a faculty between the tenured and non-tenured faculty and, to a lesser degree, between ranks. Those with senior rank typically decide the promotion and/or tenure question for those with junior rank. If the person being promoted or tenured is involved in commercial activity with one or more of the faculty deciding the question, including the chair or dean, there is a conflict of interest. Note that the conflict exists even if the senior person has no personal interest in the commercialization, but perhaps is negotiating agreements on behalf of the institution.

It can be argued that the conflict might help or might hurt the candidate's chances, depending on individual circumstances. But the issue is one of propriety, and the expectation is that the senior person will recuse himself or herself from the deliberations and decision. The CO Committee's responsibility relative

to such potential conflicts is, first, to bring the matter to the attention of those affected. Second, the committee should promote an environment where conflicts are limited to faculty who are essentially involved with the commercialization activity. That is, only people who are not involved in making Promotion and Tenure decisions should be the negotiators for the institution.

*Workload Distribution.* Founding or working at a startup is extremely difficult to do concurrently with fulfilling academic duties. Although this fact is evident to anyone trying to do both, it is sometimes necessary to remind participants that they must choose the activity to which they will devote their time. This reminder is an appropriate activity for the CO Committee.

The signs that a faculty member is not shouldering his or her load are rarely as flagrant as failing to show up for class. Rather, it will be visible in such things as performance on committee assignments; lack of participation in departmental decisions, governance, or research group leadership; diminished publication record; poor record as (undergraduate) student advisor; an unwillingness to participate in department-wide projects, and so on. Other faculty have an interest in their colleague's poor performance, of course, because they will have to take up the slack.

When the academic tradition of one-consulting-day-per-week no longer suffices for faculty to meet both their academic and commercialization responsibilities, some remedy must be sought. Leaves of absence for a limited duration are perhaps the most common solution. Reducing one's commitment to half time is another possibility. A more extreme remedy is for the affected faculty member to resign, possibly assuming an adjunct role that allows for teaching or graduate-student advising at a lower level of commitment.

For faculty involved in a commercialization activity, there are other concerns beyond time allocation. To avoid conflicts of ownership, a faculty member's university research and research advising should be kept separate from commercial R&D efforts. A faculty member or graduate student wishing to publish should not be restricted because a company claims ownership. The greater the distance between the two, the clearer it is that there is no conflict.

**Periodic Review.** Although the role of the CO Committee is more important when a commercialization activity is just beginning, there is an ongoing role as well because the relationships evolve over time.

Periodically, the committee should meet with faculty and graduate students involved in commercialization activities to review how the situation has changed, and to determine whether further facilitation is necessary. A regular schedule of meeting every six months to a year should suffice.

An additional committee responsibility might be to maintain a Web page that includes university policies and resources relevant to commercialization, a description of the CO Committee's role, and other information of potential interest to students and faculty.

### Conclusion

Although this memo necessarily raises problems that can occur in the process of commercialization, it is not intended to denigrate the process. Indeed, significant technologies—processors, servers, operating systems, databases, search engines, and so on—that we use every day were invented by students and faculty at universities, and were disseminated through the formation of new companies. Commercialization, despite the potential concerns outlined in this memo, is an effective means of transferring the accomplishments of the research community into practice for the benefit of society.

The conclusion, therefore, is not that commercialization carries with it too many risks for the university to be worth pursuing. The risks, though real, can be managed, as has been described. Rather, the conclusion is that commercialization carries too many opportunities and benefits to let these manageable risks stand in the way of transferring university-produced knowledge into practice.

### End Notes

1. The relationship of concern is principally the one between faculty and their graduate students. The relationship with undergraduate students is also important; however, when the intellectual property is created, undergraduates are often tuition payers rather than research assistants who receive stipends. This fact further complicates the problem beyond the scope of this discussion. As the overall guideline emphasizes, all relationships should be conducted in a fair and ethical way.
2. This arrangement, where the university licenses to a company formed by anyone, is based on the university's ownership of the IP stipulated in Bayh-Dole for federally funded research. Other IP may or may not be owned by the university, depending on university policy. If graduate student and faculty inventors own and control the IP themselves, their interactions become even more complex.

Approved by the  
Computing Research Association  
Board of Directors  
July 2001

Prepared by:  
David Patterson (University of California, Berkeley)  
Larry Snyder (University of Washington)